Cover Sheet

Final Environmental Assessment

Title of Environmental Review:	Snake River Basin Fall Chinook and coho salmon, and Resident Trout Fisheries
Distinct Population Segments:	Snake River Fall Chinook Salmon ESU Snake River Steelhead DPS Snake River Spring/Summer Chinook Salmon ESU Snake River Sockeye Salmon ESU
Responsible Agency and Official:	Barry A. Thom Regional Administrator National Marine Fisheries Service West Coast Region 1201 NE Lloyd Blvd., Suite 1100 Portland, Oregon 97232
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Legal Mandate:	Endangered Species Act of 1973, as amended and implemented – 50 CFR Part 223
Location of Proposed Activities:	Snake River Basin in Washington, Oregon, and Idaho. The Snake River is a tributary to the Columbia River.
Activity Considered:	The proposed management plans include fall Chinook salmon fisheries, coho salmon fisheries, and Oregon's resident trout fishery in the Snake River Basin

Table of Contents

1. Purpose Of And Need For The Proposed Action 7
   - **1.1.** Background 7
   - **1.2.** Description of the Proposed Action 8
     - 1.2.1. Framework for Fall Chinook Salmon Fisheries 9
     - 1.2.2. Framework for Coho Salmon Fisheries 11
     - 1.2.3. Management of Resident Trout Fisheries 11
   - **1.3.** Purpose and Need 11
   - **1.4.** Project Area 12
   - **1.5.** Relationship to Other Plans and Policies 15
     - 1.5.1. Secretarial Order 3206 – American Indian Tribal Rights, Federal-Tribal Trust Responsibilities and the ESA 15
     - 1.5.2. Federal Trust Responsibility 16
     - 1.5.3. U.S. v. Oregon 17
2. ALTERNATIVES INCLUDING THE PROPOSED ACTION 17
   - **2.1.** Alternative 1 (No Action) – Do Not Make a Determination under the 4(d) Rule or Tribal 4(d) Rule 18
   - **2.2.** Alternative 2 (Proposed Action) – Make a Determination that the Submitted FMEPs and TRMP Meet the Requirements of the 4(d) Rule and Tribal 4(d) Rule, Respectively. 18
   - **2.3.** Alternative 3 (Implement Additional Conservation Measures) – Make a Determination that the FMEPs (Including a Revised FMEP with Additional Conservation Measures for Fall Chinook Salmon Fisheries) and the TRMP Meet the Requirements of the 4(d) Rule and Tribal 4(d) Rule, Respectively. 18
   - **2.4.** Alternative 4 (Close fall Chinoook and coho salmon Fisheries as well as Oregon's resident trout fisheries in the Snake River Basin) – Make a Determination that the Submitted FMEPs and TRMP Do Not Meet the Requirements of the 4(d) Rule and Tribal 4(d) Rule, Respectively. 19
3. AFFECTED ENVIRONMENT 19
   - **3.1.** Wildlife 19
   - **3.2.** Fish 22
     - 3.2.1. Snake River Spring/Summer Chinook Salmon 24
     - 3.2.2. Snake River Fall Chinook Salmon 28
     - 3.2.3. Snake River Steelhead 34
     - 3.2.4. Snake River Sockeye Salmon 39
     - 3.2.5. Bull trout 42
     - 3.2.6. Other Non-Listed Fish Species 44
   - **3.3.** Vegetation 45
   - **3.4.** Socioeconomics 46
   - **3.5.** Environmental Justice 48

3.5.1. Nez Perce Tribe 50
3.5.2. Confederated Tribes of Umatilla Indian Reservation 51
3.5.3. Shoshone-Bannock Tribes 52

4. Environmental Consequences 52

4.1. Wildlife 53
4.1.1. Alternative 1 (No Action) 53
4.1.2. Alternative 2 (Proposed Action) 54
4.1.3. Alternative 3 (Additional Conservation Measure) 54
4.1.4. Alternative 4 (Close all Proposed Fisheries) 55

4.2. Fish 55
4.2.1. Alternative 1 (No Action) 56
4.2.2. Alternative 2 (Proposed Action) 59
4.2.3. Alternative 3 (Additional Conservation Measure) 61
4.2.4. Alternative 4 (Close Proposed Fisheries) 62

4.3. Vegetation 64
4.3.1. Alternative 1 (No Action) 64
4.3.2. Alternative 2 (Proposed Action) 65
4.3.3. Alternative 3 (Additional Conservation Measure) 65
4.3.4. Alternative 4 (Close Proposed Fisheries) 65

4.4. Socioeconomics 65
4.4.1. Alternative 1 (No Action) 66
4.4.2. Alternative 2 (Proposed Action) 66
4.4.3. Alternative 3 (Additional Conservation Measure) 67
4.4.4. Alternative 4 (Close Proposed Fisheries) 67

4.5. Environmental Justice 67
4.5.1. Alternative 1 (No Action) 68
4.5.2. Alternative 2 (Proposed Action) 68
4.5.3. Alternative 3 (Additional Conservation Measure) 68
4.5.4. Alternative 4 (Close Proposed Fisheries) 69

5. Cumulative Effects 69

5.1. Past, Present, and Reasonably Foreseeable Future Actions 70
5.1.1. Climate Change 71
5.1.2. Development 73
5.1.3. Habitat Restoration 74
5.1.4. Hatcheries and Harvest 74

5.2. Cumulative Effects Analysis 75
5.2.1. Wildlife 75
5.2.2. Fish 75
5.2.3. Vegetation 76
5.2.4. Socioeconomics 76
5.2.5. Environmental Justice 77

6. List of Agencies and Persons Consulted....78
7. Response to Comments....78
8. References....79

Table of Tables

Table 1. Ongoing and proposed fisheries. 9
Table 2. Proposed harvest rates for natural-origin fall Chinook salmon; MAT = minimum abundance threshold....................10
Table 3. Primary wildlife species that may interact with hatchery-origin salmon and steelhead or be affected by the Proposed Fisheries in the Study Area. 20
Table 4. Snake River spring/summer-run Chinook Salmon ESU description and MPGs (Jones Jr. 2015; NWFSC 2015). 24
Table 5. Risk levels and viability ratings for Snake River spring/summer Chinook salmon populations (NWFSC 2015); ICTRT = Interior Columbia Technical Recovery Team; MPG = Major Population Group. Data are from 2005-2014. Abundance and productivity estimates expressed as geometric means (standard error)....................27
Table 6. Snake River Fall-Run Chinook Salmon ESU description (Jones Jr. 2015; NWFSC 2015). 29
Table 7. Harvest of hatchery-origin fall Chinook salmon in state and tribal fisheries from 2010-2017. 32
Table 8. Mortality of natural-origin fall Chinook salmon in state fall Chinook salmon and tribal fisheries from 2010-2017. 33
Table 9. Snake River Basin Steelhead DPS description and MPGs (Jones Jr. 2015; NMFS 2012; NWFSC 2015). 34
Table 10. Risk levels and viability ratings for Snake River steelhead Major Population Groups (MPGs) (NWFSC 2015). Data are from 2004-2015. ICTRT = Interior Columbia Technical Recovery Team. Current abundance and productivity estimates expressed as 10-year geometric means (standard error). 38
Table 11. Snake River Sockeye Salmon ESU description (Jones Jr. 2015; NMFS 2015). 39
Table 12. Hatchery- and natural-origin sockeye salmon returns to Sawtooth Valley, 1999-2018 (Christine Kozfkay, IDFG, personal communication, March 4, 2019). 41
Table 13. Summary of environmental justice communities of concern analysis. Bold text indicates the county meets the criteria for low income community, italicized text indicates it meets the criteria for minority community, and bold italicized text indicates it meets both criteria. 48
Table 14. Summary of effects of the alternatives on wildlife relative to current conditions for Alternative 1 and to the “no action” alternative for Alternatives 2 through 4....................53
Table 15. Summary of effects of the alternatives on fish species relative to current conditions for Alternative 1 and to the “no action” alternative for Alternatives 2 through 4. 56
Table 16. Summary of effects on general vegetation relative to current conditions for Alternative 1 and to the “no action” alternative for alternatives 2 through 4. 64
Table 17. Summary of effects of the alternatives on socioeconomics relative to current conditions for Alternative 1 and to the “no action” alternative for alternatives 2 through 4. 66

Table 18. Summary of effects of the alternatives on environmental justice relative to current conditions for Alternative 1 and to the “no action” alternative for Alternatives 2 through 4 67

1. Purpose Of And Need For The Proposed Action

1.1. Background

NOAA's National Marine Fisheries Service (NMFS) is the lead agency for administering the Endangered Species Act (ESA) as it relates to ESA-listed salmon and steelhead. On July 10, 2000, NMFS issued a final rule pursuant to ESA section 4(d) (4(d) Rule), adopting regulations necessary and advisable to conserve threatened species (50 CFR 223.203). NMFS also issued a parallel ESA 4(d) Rule for Tribal Plans (i.e., the Tribal 4(d) Rule) (65 FR 111, January 3, 2000). The 4(d) Rules apply the take prohibitions in section 9(a)(1) of the ESA to salmon and steelhead listed as threatened, and sets forth specific circumstances when the take prohibitions would not apply, known as 4(d) limits. There are 13 limits in the 4(d) rule. Limit 4 is for Fishery Management and Evaluation Plans (FMEPs) developed by the state fishery agencies.

Additional information about the 4(d) rule, exemptions, and scientific concepts that NMFS uses to evaluate programs can be found at West Coast Region Fisheries.

NMFS has received a joint FMEP for Snake River Basin fall Chinook salmon fisheries from Idaho Department of Fish and Game (IDFG), Oregon Department of Fish and Wildlife (ODFW), and Washington Department of Fish and Wildlife (WDFW)(IDFG 2019b), and one Tribal Resource Management Plan (TRMP) for Snake River Basin fall Chinook salmon and coho salmon fisheries (Nez Perce Tribe 2018). IDFG also submitted a coho salmon fisheries FMEP (IDFG 2019a), and ODFW is submitted an FMEP for the state's resident trout and coho salmon fisheries (ODFW 2019). IDFG, ODFW and WDFW submitted their FMEPs under Limit 4 of the 4(d) Rule, and the Nez Perce Tribe (NPT) submitted their TRMP under the Tribal 4(d) rule.

The Snake River is a tributary to the Columbia River, and fisheries in the Columbia River are managed subject to provisions of United States v. Oregon (*U.S. v Oregon*) under the continuing jurisdiction of the Federal court. The case now styled *US v Oregon* is the outgrowth of the consolidation of two cases filed in 1968, *Sohappy v. Smith*, No. 68-409 (District of Oregon), and *U.S. v Oregon*, No. 68-513 (District of Oregon). These cases were first brought in 1968 to enforce the reserved treaty fishing rights of the Confederated Tribes of the Warm Springs Reservation of Oregon, the Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, and the Confederated Tribes and Bands of the Yakama Nation (collectively, "Columbia River Treaty Tribes"). The United States brought the case to define the Columbia River Treaty Tribes' right to take fish "at all usual and accustomed places" on the Columbia River and its tributaries. At the time the original complaint was filed, the Columbia River Treaty Tribes were limited to approximately 16% of the annual salmon harvest, based on 1960-1968 averages.

In the intervening decades, the courts have established several key principles. First, that the language of the treaties provided that the tribes retain the right to take fish at all usual and accustomed fishing places "in common with the citizens of the United States [or citizens of the territory]," reserved 50% of the harvestable fish destined for the tribes' traditional fishing places. Second, that the state may only regulate treaty fishing when reasonable and necessary for conservation. The conservation necessity applies when reasonable regulation of non-Indian activities is insufficient to meet the conservation purpose, the regulations are the least restrictive possible, the regulations do not discriminate against Indians, and voluntary tribal measures are not adequate.

The most recent *U.S. v. Oregon* Management Agreement was signed in 2018 after completion of ESA section 7 consultation and a Final Environmental Impact Statement (FEIS) (NMFS 2017c). In considering this proposed action, NMFS has determined that this Environmental Assessment (EA) shall tier itself to and fully incorporate the *U.S. v. Oregon* FEIS. This is appropriate due to the relationship of the actions. The proposed action here is fully consistent with the programmatic alternative adopted in the *U.S. v. Oregon* FEIS's record of decision. The *U.S. v. Oregon* FEIS considered all potential impacts associated with Columbia River salmon and steelhead fisheries, and while it is a recent document, this assessment will build upon the impacts considered in the *U.S. v. Oregon* FEIS and explore any additional impacts, particularly site-specific ones, beyond those previously considered. By tiering this Assessment to the *U.S. v. Oregon* FEIS, NMFS is able to narrow the scope of the analysis here to more efficiently execute our NEPA responsibilities.

1.2. Description of the Proposed Action

The Federal action evaluated in this Environmental Assessment (EA) is NMFS's proposed approval of the submitted FMEPs and TRMP under the 4(d) Rules. The submitted FMEPs and TRMP include measures intended for the conservation of ESA-listed salmonids, consistent with recovery objectives. The Proposed Action would result in the implementation of fisheries as described in the FMEPs and TRMP[1] (Table 1).

[1] NMFS's ESA review of TRMPs does not by itself permit the operation of the described fishery. The Unites States' treaties with Indian tribes and any fishing rights contained therein are the supreme law of the land, and thus, NMFS cannot make judicially binding determinations regarding the nature and extent of tribal treaty rights in the course of reviewing TRMPs. Such determinations are the province of Federal courts. NMFS's role is solely limited to making a determination as to whether a fishery would be likely to appreciably reduce the survival and recovery of ESA-listed fish.

Table 1. Ongoing and proposed fisheries.

Fishery	Agency	Location	Timing	Gear
Recreational fall Chinook salmon	WDFW	Mainstem Snake River below LGD and Tucannon River	Mid-August-November 30	Barbless hook and line
	IDFG, WDFW, ODFW	Mainstem Snake River above LGD to HCD, Salmon River, Grande Ronde River		
	IDFG	Mainstem, north, middle, and south fork Clearwater River		
Treaty fall Chinook salmon	NPT	Tucannon River, Mainstem Snake River from LGD to HCD, Clearwater River mouth to Lochsa/Selway Rivers' confluence, Lower Salmon, Grande Ronde and Imnaha Rivers	Late August-~~November~~ December 31	Dip net, gaff, spear, hook and line, seine, weir, or other traditional gear
Recreational coho salmon	IDFG	Mainstem, middle fork, north fork and south fork Clearwater River Mainstem Snake River above LGD to HCD	September 1-December 31	Barbless hook and line
	ODFW	Grande Ronde and Imnaha Rivers and tributaries within Oregon; Snake River and Oregon tributaries between the Oregon/Washington border and HCD	September 1-December ~~October~~ 31	Hook and line
Treaty coho salmon	NPT	Tucannon River, Mainstem Snake River from LGD to HCD, Clearwater River mouth to Lochsa/Selway Rivers' confluence, Lower Salmon, Grande Ronde and Imnaha Rivers	Late August-December 31	Dip net, gaff, spear, hook and line, seine, weir, or other traditional gear
Recreational resident trout	ODFW	Grande Ronde and Imnaha Rivers and tributaries within Oregon, and Oregon portion of the Snake River mainstem	~~4th Saturday in May - October 31~~See Figure 3	Hook and line

1.2.1. Framework for Fall Chinook Salmon Fisheries

The Proposed Action is to manage all fisheries targeting or with incidental take of Snake River Fall Chinook subject to a common "sliding scale" or variable harvest rate schedule (Table 2). Under the proposed sliding scale, as natural-origin run size increases, the proportion of allowable lethal take also increases. Abundance, under the proposed sliding scale, is determined by adding Lower Granite Dam (LGD) counts. Directed non-tribal harvest of adipose-intact fall Chinook would not be allowed when natural-origin fall Chinook abundance is forecasted below 1,260 (the critical abundance threshold (CAT)) adults; Snake River fall Chinook salmon impacts would be limited to incidental impacts during the adipose fin-clipped Fall Chinook salmon, steelhead and coho fisheries. If the natural-origin abundance was less than 0.1 of MAT for two consecutive years (420 fish), in addition to not having a targeted fall Chinook salmon fishery (adipose fin-clipped or adipose-intact) the states would manage to further reduce their impacts through measures such as time/area closures, and/or reduced bag limits for fisheries targeting other species (e.g., coho salmon). Furthermore, after two consecutive years of abundance below the CAT, the NPT would manage their fisheries to reduce natural-origin impacts. Incidental take of Snake River fall Chinook salmon during steelhead, resident trout, and coho salmon fisheries are included in the prescribed limits in Table 2.

Table 2. Proposed harvest rates for natural-origin fall Chinook salmon; MAT = minimum abundance threshold.

Natural-origin adult run size relationship to MAT	Natural-origin adult run size to Lower Granite Dam	Maximum harvest rate (%)	Number of natural-origin adults harvested	
			lower	upper
0.0-0.3	0-1260	6.0	0	76
0.3-0.5	1261-2100	8.0	101	168
0.5-0.75	2101-3150	9.0	189	284
0.75-1.2	3151-5040	14.0	441	706
> 1.2	> 5041	20.0 + 44.0*	>1378	

*20% harvest rate plus 44% on the margin (e.g., at an abundance of 5,200 fish, harvest is determined as follows: (5,200*0.20) + (5,200-5040*0.44) = 1,110 natural-origin fish harvested.

Managers intend to distribute impacts in proportion to the number and distribution of redd count data so that segments of the population are not disproportionately impacted. For example, the States propose to partition 5 percent of the non-tribal impacts into the area below LGD, 47 percent of the non-tribal impacts into the Snake River/Salmon River/Grande Ronde Rivers and 48 percent of the non-tribal impacts into the Clearwater River. There is no spawning aggregate in the Snake River between LGD and Blue Bridge. Thus, fish harvested in this reach would be destined for the upstream reaches, and any impacts in this area would be added to the harvest in upstream reaches and impacts assessed on the total redd count proportions in those upstream reaches.

Managers intend to limit the season temporally and spatially where fall Chinook salmon spawn in the Clearwater River to minimize the effects to spawning fish and redds. The fishery managers propose to close fishing for fall Chinook salmon when the proportion of total redds constructed in the Clearwater River is ≥ 20% (typically mid-October). The 20% initiation date will be based on the most recent five-year average, across four high density spawning areas totaling 5.1 river kilometers; specifically the Myrtle, Cherry Lane, Big Canyon, and Ahsahka Islands spawning areas.

1.2.2. Framework for Coho Salmon Fisheries

Coho fisheries in the Snake River Basin and its tributaries are managed to help meet multiple objectives: treaty and non-treaty harvest, hatchery brood needs, and provide for natural spawning. Preseason and in-season run forecasts are used in planning and implementing treaty and non-treaty fisheries. The general approach is to determine total harvestable fish by subtracting the broodstock needs from run forecast and then implement fisheries using 50:50 harvest sharing principle to allocate the harvest between treaty and non-treaty fisheries.

The Nez Perce Tribe will continue to review and update the Coho salmon run information to allow for more precise estimates of run abundance. The Tribe will use this information to manage tributary fishery harvest during the run.

1.2.3. Management of Resident Trout Fisheries

Currently there are no releases of hatchery trout within the FMEP area (Table 1). Trout regulations on 67 miles of the Grande Ronde (RM 37-82) and Wallowa (RM 0-19) rivers and lower 24 miles of the Imnaha River are designed to focus harvest on hatchery steelhead residuals by limiting rainbow trout harvest to only adipose fin-clipped fish. Resident trout harvest is also limited to an 8-inch minimum size. Steelhead less than 20 inches in length are treated as rainbow trout in the Oregon Sport Fishing Regulations. Bait and artificial lures are generally allowed in most FMEP areas with a few restrictions (see Chapter 3, Bull trout).

1.3. Purpose and Need

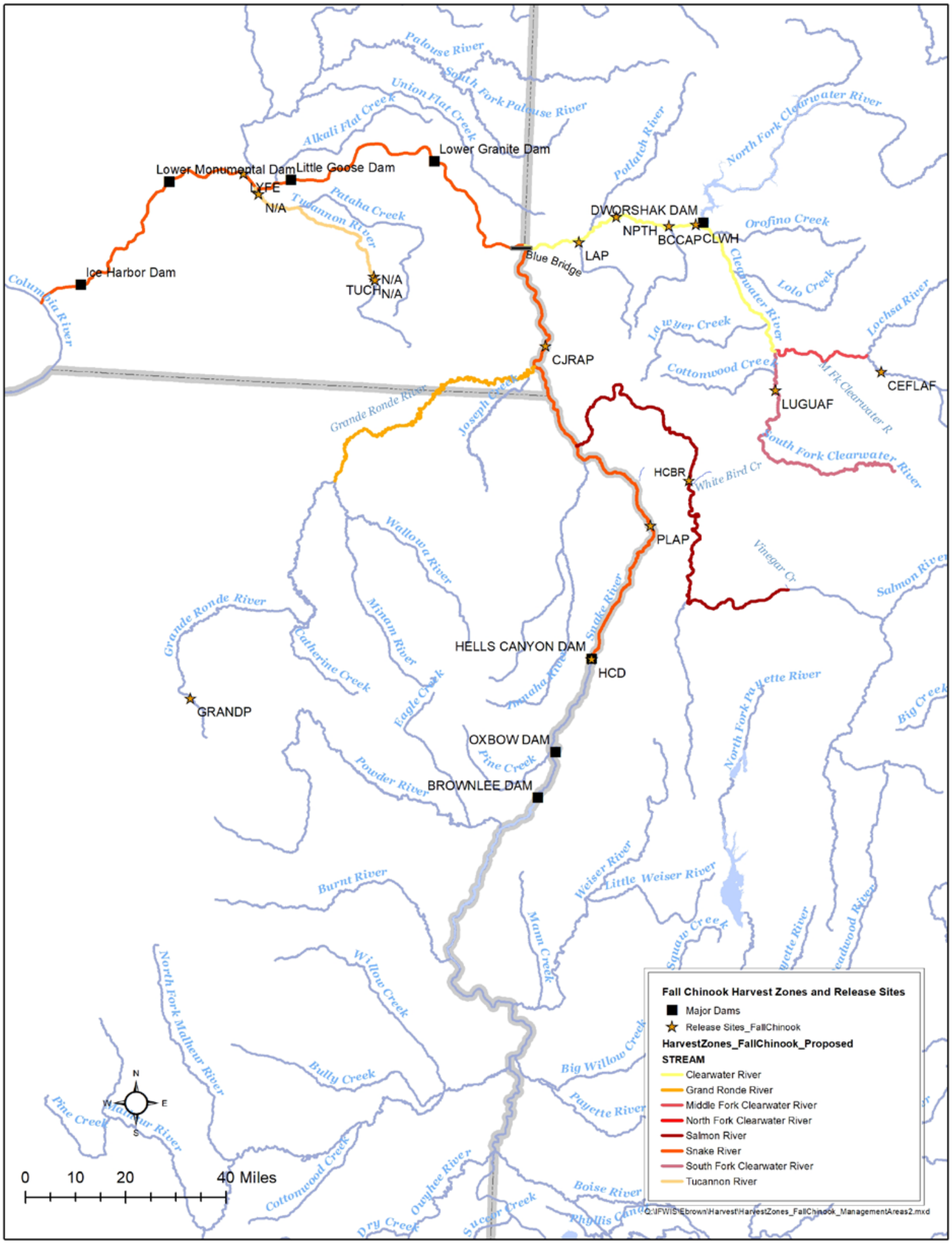
The purpose and need for the Proposed Action is three-fold: (1) to meet the Federal government's tribal treaty rights and trust and fiduciary responsibilities to the Nez Perce Tribe and other tribes; (2) to support fishing opportunities in the Idaho, Oregon, and Washington waters of the Snake River Basin; and (3) to work collaboratively with co-managers and other affected parties to protect and conserve ESA-listed species.

NMFS has an obligation to administer the provisions of the ESA and to protect ESA-listed species. NMFS also has a Federal trust responsibility to the treaty Indian tribes, as well as a duty to support the fishing rights reserved in their treaties as defined by the Federal courts. Because of the Federal government's trust responsibility to the tribes, NMFS is committed to considering the tribal co-managers' judgment and expertise regarding conservation of trust resources.

1.4. PROJECT AREA

The project area includes the entire Snake River mainstem up to Hells Canyon Dam, the Tucannon River, Grande Ronde River, Clearwater River, and Salmon River Subbasins. Figure 1 and Figure 2 include areas in Idaho, southeast Washington, and northeast Oregon open to state-managed fall Chinook fisheries. Figure 2 includes harvest areas as they relate to the NPT's 1855 Reservation and usual and accustomed fishing areas.

Figure 1. Proposed fishing areas in FMEPs and TRMP



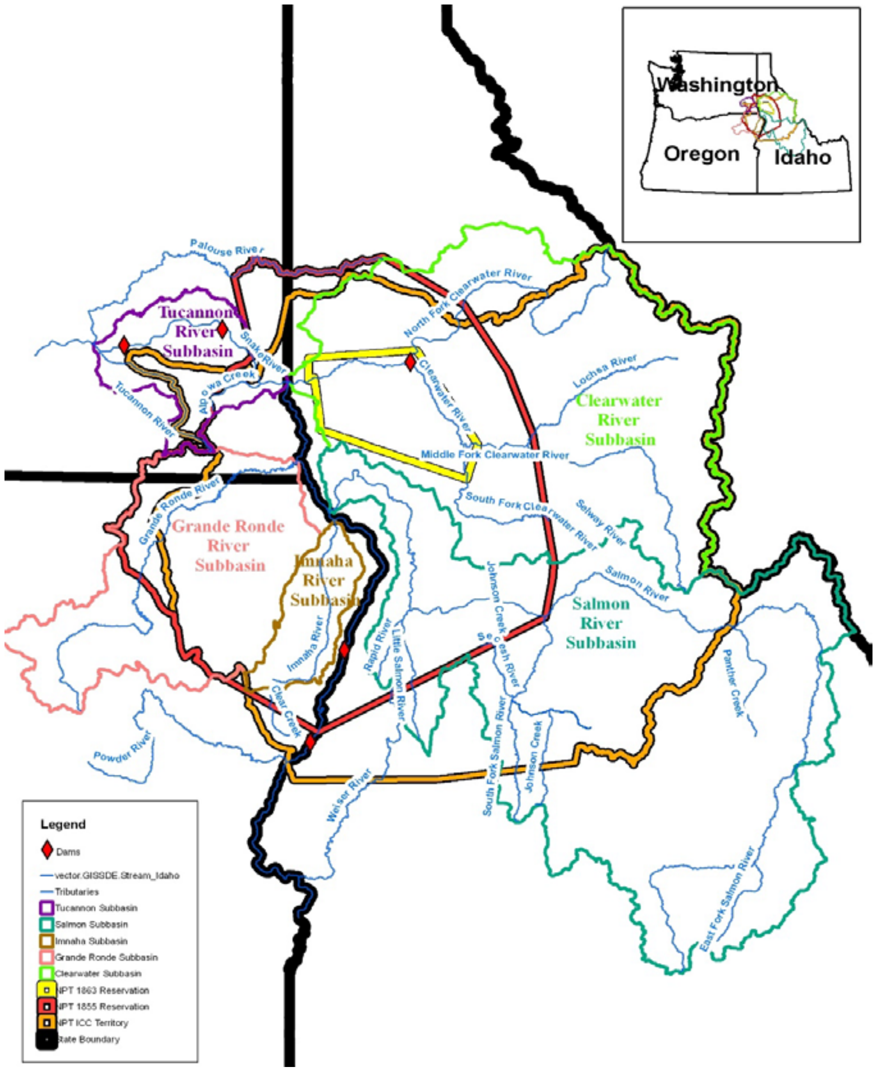


Figure 2. The Snake River Basin and its harvest areas as they relate to the Nez Perce Tribe's 1855 Reservation and usual and accustomed fishing areas.

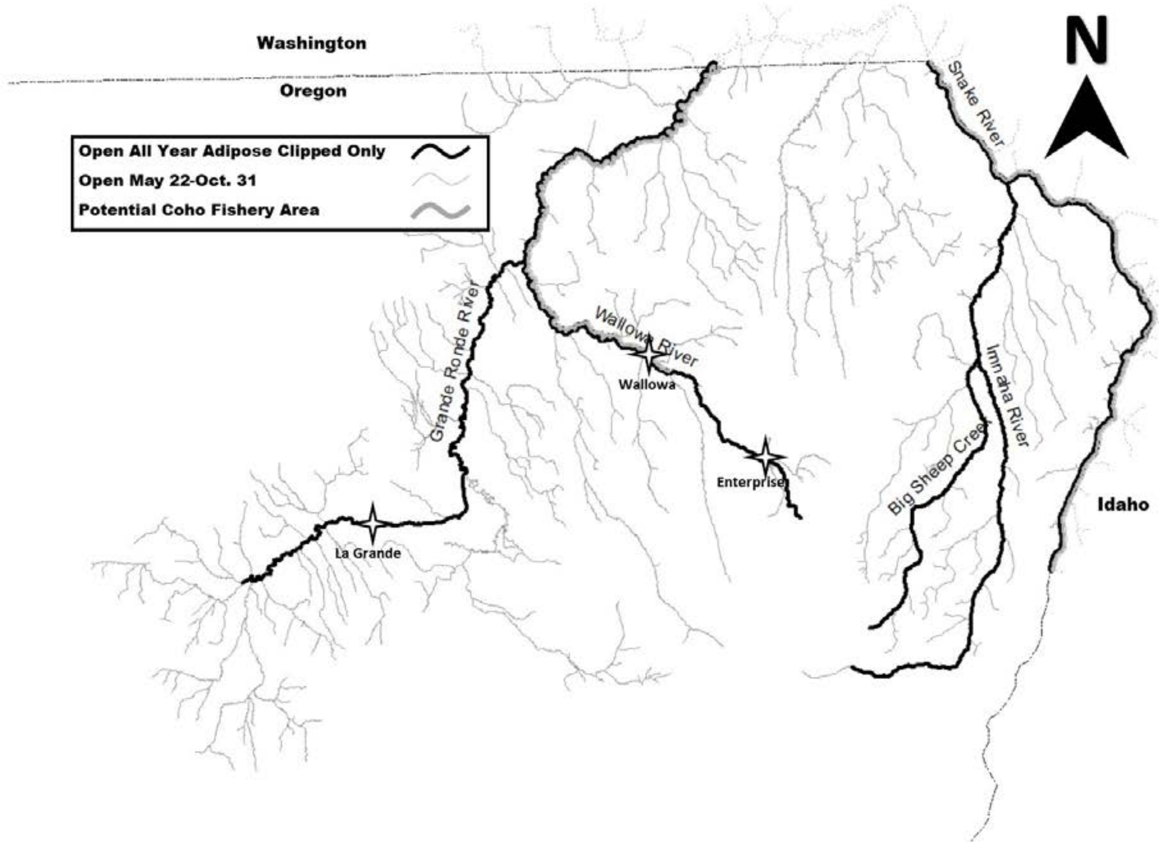


Figure 3 Fishery management area, including reaches that (1) are open all year for harvest of adipose-clipped trout (black lines), (2) open from May 22 to October 31 (thin gray lines) and (3) are potential areas for Coho Salmon fisheries (thick gray lines).

1.5. RELATIONSHIP TO OTHER PLANS AND POLICIES

Other plans, regulations, agreements, treaties, laws, and Secretarial and Executive Orders also affect fisheries activities in the Snake River Basin and their effects on resources in the project area. These are summarized below to provide additional context for the following evaluation of the Snake River Basin FMEPs and TRMP and their effects on the environment.

1.5.1. Secretarial Order 3206 – American Indian Tribal Rights, Federal-Tribal Trust Responsibilities and the ESA

Secretarial Order 3206, American Indian Tribal Rights, Federal-Tribal Trust Responsibilities and the ESA, issued by the secretaries of the Departments of Interior and Commerce, clarifies the responsibilities of the agencies, bureaus, and offices of the departments when actions taken under the ESA and its implementing regulations affect, or may affect, Indian lands, tribal trust resources, or the exercise of American Indian tribal rights as they are defined in the order.

Secretarial Order 3206 acknowledges the trust responsibility and treaty obligations of the United States towards tribes and tribal members, as well as its government-to-government relationship when corresponding with tribes. Under the order, NMFS and the U.S. Fish and Wildlife Service (Services) “will carry out their responsibilities under the [ESA] in a manner that harmonizes the Federal trust responsibility to tribes, tribal sovereignty, and statutory missions of the [Services], and that strives to ensure that Indian tribes do not bear a disproportionate burden for the conservation of listed species, so as to avoid or minimize the potential for conflict and confrontation.”

More specifically, the Services shall, among other things, do the following:

- Work directly with Indian tribes on a government-to-government basis to promote healthy ecosystems (Sec. 5, Principle 1)
- Recognize that Indian lands are not subject to the same controls as Federal public lands (Sec. 5, Principle 2)
- Assist Indian tribes in developing and expanding tribal programs so that healthy ecosystems are promoted, and conservation restrictions are unnecessary (Sec. 5, Principle 3)
- In cases that involve the potential for incidental take under the ESA, the Services will analyze and determine whether conservation restrictions meet the following standards:
    - the restriction is reasonable and necessary for conservation of the species at issue;
    - the conservation purpose of the restriction cannot be achieved by reasonable regulation of non-Indian activities;
    - the measure is the least restrictive alternative available to achieve the required conservation purpose;
    - the restriction does not discriminate against Indian activities, either as stated or applied
    - voluntary tribal measures are not adequate to achieve the necessary conservation purpose; and
    - be sensitive to Indian culture, religion, and spirituality (Sec. 5, Principle 4)

1.5.2. Federal Trust Responsibility

The United States government has a trust or special relationship with Indian Tribes. The unique and distinctive political relationship between the United States and Indian Tribes is defined by treaties, statutes, executive orders, judicial decisions, federal agency policies, and agreements. It differentiates tribes from other entities that deal with, or are affected by, the Federal government.

Executive Order 13175, Consultation and Coordination with Indian Tribal Governments requires each Federal agency to establish procedures for meaningful consultation and coordination with tribal officials in the development of Federal policies that have tribal implications. The

Department of Commerce (DOC) Administrative Order (DAO) 218-8 and the "Tribal Consultation and Coordination Policy of the U.S. Department of Commerce" together constitute DOC's "Tribal Consultation Policy". When working with our Native American tribal partners, NMFS enacts this policy outlined in our NOAA tribal consultation handbook: "NOAA Procedures for Government-to-Government Consultation with Federally Recognized Indian Tribes and Alaska Native Corporations."

1.5.3. U.S. v. Oregon

The court in *U.S. v. Oregon* (302 F.Supp. 899, 1978) ruled that state regulatory power over Indian fishing is limited because the 1855 treaties between the United States and the Nez Perce, Umatilla, Warm Springs, and Yakama Tribes preserved the tribes' right to fish at all usual and accustomed places, whether on or off reservation. Because of this decision, fisheries in the Columbia River are governed through the Columbia River Fish Management Agreement which was carefully negotiated by the Federal and state governments and the involved treaty Indian tribes. The most recent Management Agreement, entered as a court order in 2018 and set to expire on December 31, 2027, provides the current framework for managing fisheries and hatchery programs in much of the Columbia River Basin (NMFS 2018b). The agreement includes a list of hatchery programs with stipulated production levels, and a list of tribal and non-tribal salmonid fisheries in the Columbia River Basin, including designated off-channel sites that are intended to: (1) ensure fair sharing of harvestable fish between tribal and non-tribal fisheries in accordance with Treaty fishing rights standards and *U.S. v. Oregon*, and (2) be responsive to the needs of ESA-listed species. For more details about the history of the Management Agreement, see the 2018 *U.S. v. Oregon* Management Agreement FEIS in Section 1.6.1 (NMFS 2017c). The FMEPs and TRMP would be implemented and enforced by the same fishery managers that are parties to the *U.S. v. Oregon* Agreement.

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

Four alternatives are considered in this EA: (1) NMFS would not make a determination under the 4(d) Rule or Tribal 4(d) Rule, (2) NMFS would make a determination that the submitted FMEPs and TRMP meet the requirements of the 4(d) Rule and Tribal 4(d) Rule, respectively, (3) NMFS would make a determination that revised fall Chinook salmon FMEP with additional conservation measures meet the requirements of the 4(d) Rule and that the submitted TRMP[2] meets the requirement of the Tribal 4(d) Rule (coho salmon and resident trout fisheries would be the same as under Alternative 2), (4) NMFS would make a determination that the submitted FMEPs and TRMP do not meet the requirements of the 4(d) Rule and Tribal 4(d) Rule, respectively. No other alternatives that would meet the purpose and need were identified that

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[2] Tribal fisheries are not selective for hatchery-origin fish and each tribe has a treaty right to fish in their Usual and Accustomed Areas.

would be appreciably different from the four alternatives described below.

2.1. Alternative 1 (No Action) – Do Not Make a Determination under the 4(d) Rule or Tribal 4(d) Rule

Under Alternative 1, NMFS would not make determinations under the 4(d) Rule or Tribal 4(d) Rule. NMFS recognizes the possibility that the Alternative 1 could result in closure of fisheries in the Snake River Basin directed at hatchery-origin fall Chinook salmon, coho salmon or resident trout. However, this is not NMFS' best estimate of what would occur, and discontinuation is the subject of Alternative 4. Under the no-action alternative, ongoing fisheries would be expected to continue, including recreational adipose fin-clipped and Treaty Tribal fall Chinook salmon fisheries. However, under the no-action alternative, there would be uncoordinated harvest among the fishing parties. Because each fishing party would manage their fishery independently, it is difficult to predict the total level of fishing that would occur under this alternative. Coho salmon and resident trout fisheries would also likely continue as under baseline conditions. This alternative corresponds to Alternative 6 of the *US v. Oregon* FEIS, under which the parties would have taken no action on the agreement.

2.2. Alternative 2 (Proposed Action) – Make a Determination that the Submitted FMEPs and TRMP Meet the Requirements of the 4(d) Rule and Tribal 4(d) Rule, Respectively.

Under this alternative, NMFS would make a determination that the submitted FMEPs and TRMP meet the requirements of the 4(d) Rule and Tribal 4(d) Rule, and directed fall Chinook salmon fisheries, coho salmon fisheries, and resident trout fisheries in the Snake River Basin would be implemented as described in the FMEPs and TRMP, and as summarized in the Proposed Action section above. Table 1 provides a list including location, timing and allowed gear that would be used for proposed fisheries considered under Alternative 2. This alternative corresponds to Alternative 3 in the *U.S. v Oregon* FEIS.

2.3. Alternative 3 (Implement Additional Conservation Measures) – Make a Determination that the FMEPs (Including a Revised FMEP with Additional Conservation Measures for Fall Chinook Salmon Fisheries) and the TRMP Meet the Requirements of the 4(d) Rule and Tribal 4(d) Rule, Respectively.

Under Alternative 3, NMFS would make a determination that the submitted FMEPs, including a revised fall Chinook salmon FMEP (with an additional conservation measure for fall Chinook salmon) and the TRMP meet the requirements of the 4(d) Rule and Tribal 4(d) Rule, respectively. Fall Chinook salmon fisheries under Alternative 3 would be managed the same as under Alternative 2, except that recreational adipose-intact fall Chinook salmon fisheries under this alternative would be prohibited in the area upstream of the Salmon River confluence with the Snake River to Hells Canyon Dam (RM 188.2 to 247.0 on the Snake River) regardless of natural-origin fall Chinook salmon abundance. This area is the natural production emphasis area (NPEA) identified in NMFS' opinion on the fall Chinook salmon hatchery programs, and no releases of hatchery fish occur in this reach of the mainstem Snake River (NMFS 2018a). Coho fisheries and resident trout fishery would be the same under Alternative 3 and Alternative 2.

2.4. Alternative 4 (Close fall Chinoook and coho salmon Fisheries as well as Oregon's resident trout fisheries in the Snake River Basin) – Make a Determination that the Submitted FMEPs and TRMP Do Not Meet the Requirements of the 4(d) Rule and Tribal 4(d) Rule, Respectively.

Under this alternative, NMFS would make a determination that the submitted FMEPs and TRMP do not meet the requirements of the 4(d) Rule and Tribal 4(d) Rule. For the purposes of this EA, we will assume that all fisheries in the Snake River Basin targeting fall Chinook salmon and coho salmon would be closed (recreational and tribal), as well as ODFW's resident trout fishery. This alternative would not meet our purpose and need for the action because this alternative would not (1) meet the Federal government's tribal treaty rights and trust responsibilities or (2) support meaningful fishing opportunities in the Oregon, Washington, and Idaho waters of the Snake River Basin. Further, it would result in a higher proportion of hatchery-origin fall Chinook salmon on the spawning grounds, which could increase the risk to the ESA-listed ESU. However, NMFS supports analysis of this alternative to assist with a full understanding of potential effects on the human environment under various management scenarios, including those that do not achieve the purpose and need. This alternative corresponds to Alternative 5 in the *U.S. v Oregon* FEIS.

3. AFFECTED ENVIRONMENT

In this section, status quo conditions are described for resources that may be affected by the proposed action: wildlife, fish, vegetation, socioeconomics, cultural resources, and environmental justice. This section builds and expands on the affected environment section found in the *U.S. v Oregon* FEIS (NMFS 2017c).

The proposed action does not include any form of construction or demolition to bridges, dams, hydroelectric facilities, or other related infrastructure. Therefore, no effects are expected on river transportation, river navigation, or historical properties (Section 106 of the National Historic Preservation Act). No detectable effects on water quality would be expected outside of effects on marine-derived nutrients, which are described within Section 3.2, Fish. The proposed action and its alternatives are not expected to have any detectable effect on Greenhouse Gas Emissions.

3.1. Wildlife

A comprehensive list of wildlife species and potential effects is provided in Section 3.5 of the Mitchell Act FEIS (NMFS 2014a). The species listed in Table 3 are likely those affected by the proposed action. The relative reduction of salmon carcasses, by removing adult fish before they spawn, would likely affect local wildlife by removing a small proportion of the nutrient source.

The fisheries included in this EA have the potential to affect wildlife by removing either predators or prey, altering nutrient availability, or temporarily changing wildlife movement (Table 3). Salmon carcasses are an important food source for bald eagles *(Haliaeetus leucocephalus)*. Other avian predators include the golden eagle (*Aquila chrysaetos*), osprey (*Pandion haliaetus*), and great blue heron (*Ardea Herodias*), which are residents of shorelines and shallow waters where the proposed fisheries would occur. The Bliss Rapids snail (*Taylorconcha serpenticola*) and the Snake River physa snail (*Physa natricina*) both occur in the study area (USFWS 2017a; USFWS 2017b). Although studies have not demonstrated salmon consumption of snails, anecdotal information suggests that snails could be a minor part of the salmon diet (NMFS 2014b).

Table 3. Primary wildlife species that may interact with hatchery-origin salmon and steelhead or be affected by the Proposed Fisheries in the Study Area.

Species[1]	**Range in relationship to study area**	**Federal/State Listing Status**	**Relationship**		
			Prey	**Predator**	**Benefits from Carcasses**
Birds					
Bald Eagle (*Haliaeetus leucocephalus)*	Throughout the Columbia River Basin	Federally protected under Bald Eagle and Golden Eagle Protection Act		✓	✓
Golden Eagle (*Aquila chrysaetos)*	Throughout the Columbia River Basin	Federally protected under Bald Eagle and Golden Eagle Protection Act Washington State candidate		✓	✓
Osprey (*Pandion haliaetus*)	Throughout the Columbia River Basin	Not listed		✓	
Great Blue Heron (*Ardea herodias*)	Throughout the Columbia River Basin	Not listed		✓	✓

Species[1]	Range in relationship to study area	Federal/State Listing Status	Relationship		
			Prey	Predator	Benefits from Carcasses
Mammals					
Canada Lynx (*Lynx canadensis*)	Subalpine forests in study area	Federally threatened (65 FR 16053 16086) Idaho State threatened Washington State endangered		✓	✓
North American Wolverine (*Gulo gulo luscus*)	Subalpine forests in study area	Federally proposed threatened Oregon State threatened Washington State candidate		✓	✓
Northern Idaho Ground Squirrel (*Urocitellus brunneus*)	Dry meadows surrounded by coniferous forests; near McCall Fish Hatchery	Federally threatened (65 FR 17780) Idaho State threatened			✓
River Otter (*Lontra canadensis*)	Throughout the Columbia River Basin	Not listed		✓	✓
Mink (*Neovison vison*)	Throughout the Columbia River Basin	Not listed		✓	✓
Invertebrates					
Bliss Rapids Snail (*Taylorconcha serpenticola*)	Middle Snake River	Federally threatened (57 FR 59244)	✓		✓
Snake River Physa Snail (*Physa natricina*)	Middle Snake River	Federally endangered (57 FR 59244)	✓		✓
Marine Mammals					
Southern Resident Killer Whale	Marine environment	Federally threatened (80 FR 7380)		✓	
Pinnipeds	Marine environment	Not Listed		✓	

Source: (NMFS 2014b; USFWS 2017a; USFWS 2017b)

Mammals that occur in the study area may consume salmon and resident trout, or may encounter and be affected by the proposed fisheries. Canada lynx (*Lynx canadensis*) maintain large home ranges and are highly mobile, and may occasionally travel through Hells Canyon and the Salmon

River (USFWS 2017a). Wolverines (*Gulo gulo luscus*) are also highly mobile and may travel through higher elevation areas associated with the proposed fisheries. Some fisheries are located within the range of the northern Idaho ground squirrel (*Urocitellus brunneus* (USFWS 2003 in USFWS 2017a). River otters (*Lontra canadensis*) may consume spawning salmon, and salmon carcasses (Cederholm et al. 2000). Mink (*Neovison vison*) occur throughout the Study Area and may consume salmon and resident trout (Melquist et al. 1997; NMFS 2014b).

The Southern Resident Killer Whale DPS (SRKW) is ESA-listed as endangered. NMFS' recovery plan for SRKW states the decline of Columbia River salmon as possibly the greatest change in food availability for SRKW since the late 1800s (NMFS 2008b). Returns during the 1990s averaged only 550,000 adult salmonids crossing Bonneville Dam; a decline of 90 percent or more from historical levels. More recently, returning adults crossing Bonneville Dam have increased, as the 10-year average (2009-2018) of all salmonids crossing Bonneville Dam is now 1.72 million[3] (Fish Passage Center Query – April 4, 2019). SRKW pods have been sighted off the West Coast as far south as Monterey, California (NMFS 2008b). These whales are known to prey upon salmon in the ocean; therefore, SRKW may be affected by the proposed Chinook and coho salmon fisheries. Similarly, pinnipeds also prey on salmon, and therefore may be individually affected by the proposed Chinook and coho salmon fisheries.

As described in the Mitchell Act FEIS (NMFS 2014b), hatchery salmon and steelhead currently provide the majority of the total fish produced from the Columbia River Basin. As such, the status quo condition of SRKWs and pinnipeds that rely on salmon or steelhead from the Columbia River are affected by the current level of overall hatchery production of these species rather than the removal of fish after entering the Snake River system (subsequent to marine mammal predation on fish in coastal and marine environments). Status quo conditions for SRKW and pinnipeds, resulting, in part, from recent levels of hatchery Chinook salmon production in the Columbia River Basin are described in Section 3.5.3.1.1, of the Mitchell Act FEIS, and incorporated herein by reference. In brief, hatchery broodstock needs are considered for fall Chinook and coho salmon prior to setting harvest targets, ensuring that hatchery production remains consistent annually.

3.2. FISH

The following sections describe baseline conditions for fish species within the project area. Since 1991, NMFS has identified 12 ESUs and DPSs of Columbia River Basin salmon and Columbia River Basin steelhead as requiring protection under the ESA. The following ESA-listed fish species may be impacted by the proposed fisheries:

- Snake River spring-summer Chinook salmon
- Snake River Fall Chinook salmon
- Snake River steelhead

[3] Fish Passage Center query.

- Snake River sockeye salmon
- Bull trout

Baseline conditions for these ESA-listed species are found in Section 3.2.1 through Section 3.2.6.

NMFS has determined the range-wide status of critical habitat for ESA-listed species by examining the condition of its physical and biological features (PBFs) that were identified when critical habitat was designated. These features are essential to the conservation of the listed species because they support one or more of the species' life stages. An example of some PBFs are listed below. These are often similar among listed salmon and steelhead; specific differences can be found in the critical habitat designation for each species.

(1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;

(2) Freshwater rearing sites with: (i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; (ii) Water quality and forage supporting juvenile development; and (iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks;

(3) Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival;

(4) Estuarine areas free of obstruction and excessive predation with: (i) Water quality, water quantity, salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and (iii) Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation;

(5) Near-shore marine areas free of obstruction and excessive predation with: (i) Water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and (ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels;

(6) Offshore marine areas with water-quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

3.2.1. Snake River Spring/Summer Chinook Salmon

On June 3, 1992, NMFS listed the Snake River spring/summer-run Chinook Salmon ESU as a threatened species (57 FR 23458). More recently, the threatened status was reaffirmed on June 28, 2005 (70 FR 37160) and on April 14, 2014 (79 FR 20802). Critical habitat was originally designated on December 28, 1993 (58 FR 68543) but updated most recently on October 25, 1999 (65 FR 57399).

Twenty eight historical populations (four extirpated) within five MPGs comprise the Snake River spring/summer-run Chinook Salmon ESU. The natural populations are aggregated into the five extant MPGs based on genetic, environmental, and life-history characteristics (Figure 3). The Snake River spring/summer-run Chinook Salmon ESU also includes 10 hatchery programs (Jones Jr. 2015; NWFSC 2015). However, inside the geographic range of the ESU, there are a total of 19 hatchery spring/summer-run Chinook salmon programs currently operational (Jones Jr. 2015). As explained above, genetic resources can be housed in a hatchery program but for a detailed description of how NMFS evaluates and determines whether to include hatchery fish in an ESU or DPS, see NMFS (2005). Table 4 lists the natural and hatchery populations included (or excluded) in the ESU.

Table 4. Snake River spring/summer-run Chinook Salmon ESU description and MPGs (Jones Jr. 2015; NWFSC 2015).

ESU Description	
Threatened	Listed under ESA in 1992; updated in 2014.
Major Population Groups (5)	***Extant Populations (28)***
Lower Snake River	Tucannon River
Grande Ronde/Imnaha River	Wenaha, Lostine/Wallowa, Minam, Catherine Creek, Upper Grande Ronde, Imnaha
South Fork Salmon River	Secesh, East Fork/Johnson Creek, South Fork Salmon River Mainstem, Little Salmon River
Middle Fork	Bear Valley, Marsh Creek, Sulphur Creek, Loon Creek, Camas Creek, Big Creek, Chamberlain Creek, Lower Middle Fork (MF) Salmon, Upper MF Salmon
Upper Salmon	Lower Salmon Mainstem, Lemhi River, Pahsimeroi River, Upper Salmon Mainstem, East Fork Salmon, Valley Creek, Yankee Fork, North Fork Salmon
Artificial production	

ESU Description	
Hatchery programs included in ESU (10)	Tucannon River Spr/Sum, Lostine River Spr/Sum, Catherine Creek Spr/Sum, Lookingglass Hatchery Reintroduction Spr/Sum, Upper Grande Ronde Spr/Sum, Imnaha River Spr/Sum, McCall Hatchery summer, Johnson Creek Artificial Propagation Enhancement summer, Pahsimeroi Hatchery summer, Sawtooth Hatchery spring.
Hatchery programs not included in ESU (8)	South Fork Chinook Eggbox spring, Panther Creek summer, Yankee Fork SBT spring, Rapid River Hatchery spring, Dworshak NFH spring, Kooskia spring, Clearwater Hatchery spring, Nez Perce Tribal Hatchery spring.

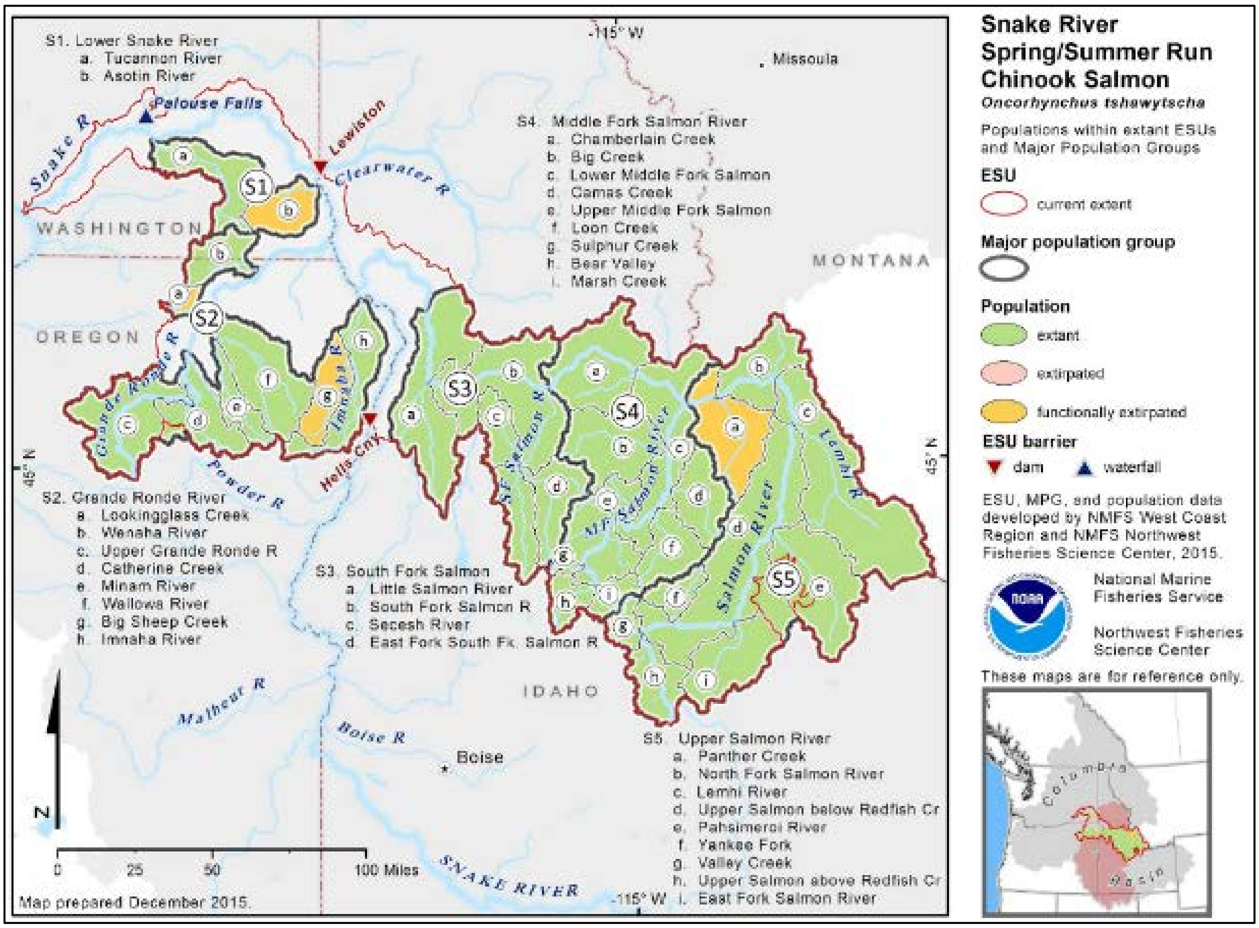

Figure 4. Snake River spring/summer-run Chinook Salmon ESU spawning and rearing areas, illustrating natural populations and MPGs (NWFSC 2015).

Abundance, Productivity, Spatial Structure, and Diversity

Status of the species is determined based on the abundance, productivity, spatial structure, and diversity of its constituent natural populations. Best available information indicates that Snake River spring/summer-run Chinook Salmon ESU remains at high overall risk, with the exception of one population (Chamberlain Creek). The recovery plan developed by NMFS (NMFS 2017b) incorporated viability criteria recommended by the Interior Columbia River Technical Recovery Team (ICTRT). The population level goals are based on a set of metrics used to assess the viability of a salmon population – abundance, productivity, spatial structure, and diversity (McElhany et al. 2000). The ICTRT approach calls for comparing estimates of current natural-origin abundance and productivity against predefined viability curves (NWFSC 2015). Achieving recovery (i.e., delisting the species) of the ESU via sufficient improvement in the abundance, productivity, spatial structure, and diversity is the longer-term goal of the recovery plan.

NMFS most recent status review found that natural-origin abundance has increased over the levels reported in the prior status review (Ford et al. 2011) for most populations in this ESU, although the increases were not substantial enough to change viability ratings. Relatively high ocean survivals in the years preceding the most recent review were a major factor in recent abundance patterns. Ten natural populations increased in both abundance and productivity, seven increased in abundance while their updated productivity estimates decreased, and two populations decreased in abundance and increased in productivity. One population, Loon Creek, decreased in both abundance and productivity. Overall, all but one population in this ESU remains at high risk for abundance and productivity and there is a considerable range in the relative improvements to life cycle survivals or limiting life stage capacities required to attain viable status.

Spatial structure ratings remain unchanged or stable with low or moderate risk levels for the majority of the populations in the ESU (Table 5). Four populations from three MPGs (Catherine Creek and Upper Grande Ronde of the Grande Ronde/Imnaha MPG, Lemhi River of the Upper Salmon River MPG, and Lower MF Mainstem of the MF MPG) remain at high risk for spatial structure loss. Four of the five extant MPGs in this ESU have populations that are undergoing active supplementation with local broodstock hatchery programs. In most cases, those programs evolved from mitigation efforts and include some form of sliding scale management guidelines that limit hatchery contribution to natural spawning based on the abundance of natural-origin fish returning to spawn – the more natural-origin fish that return the fewer hatchery fish that are needed to spawn naturally. Sliding-scale management is designed to maximize hatchery benefits in low abundance years and reduce hatchery risks at higher spawning levels. Efforts to evaluate key assumptions and impacts are underway for several programs (NWFSC 2015).

Table 5. Risk levels and viability ratings for Snake River spring/summer Chinook salmon populations (NWFSC 2015); ICTRT = Interior Columbia Technical Recovery Team; MPG = Major Population Group. Data are from 2005-2014. Abundance and productivity estimates expressed as geometric means (standard error).

MPG	Population	ICTRT minimum threshold	Natural spawning abundance	Proportion natural-origin spawners	Productivity	Abundance and productivity risk	Spatial structure and diversity risk	Overall rating
Lower Snake	Tucannon River	750	267 (0.19)	0.67	0.69 (0.23)	High	Moderate	High risk
	Asotin Creek	500	Extirpated					
Grande Ronde/ Imnaha	Wenaha River	750	399 (0.12)	0.76	0.93 (0.21)	High	Moderate	High risk
	Lostine/Wallowa River	1000	332 (0.24)	0.45	0.98 (0.12)	High	Moderate	High risk
	Lookingglass Creek	500	Extirpated					
	Minam River	750	475 (0.12)	0.89	0.94 (0.18)	High	Moderate	High risk
	Catherine Creek	1000	110 (0.31)	0.45	0.95 (0.15)	High	Moderate	High risk
	Upper Grande Ronde	1000	43 (0.26)	0.18	0.59 (0.28)	High	High	High risk
	Imnaha River	750	328 (0.21)	0.35	1.2 (0.09)	High	Moderate	High risk
	Big Sheep Creek	500	Extirpated					
South Fork (SF)	SF Mainstem	1000	791 (0.18)	0.77	1.21 (0.2)	High	Moderate	High
	Secesh River	750	472 (0.18)	0.98	1.25 (0.2)	High	Low	High
	EF/Johnson Creek	1000	208 (0.24)	0.61	1.15 (0.2)	High	Low	High
	Little Salmon River	750	Insufficient data				Low	High
Middle Fork (MF)	Chamberlain Creek	750	641 (0.17)	1.0	2.26 (0.45)	Moderate	Low	Maintained
	Big Creek	1000	154 (0.23)	1.0	1.1 (0.21)	High	Moderate	High
	Loon Creek	500	54 (0.1)	1.0	0.98 (0.4)	High	Moderate	High
	Camas Creek	500	38 (0.2)	1.0	0.8 (0.29)	High	Moderate	High
	Lower mainstem MF	500	Insufficient data				Moderate	High
	Upper mainstem MF	750	71 (0.18)	1.0	0.5 (0.72)	High	Moderate	High
	Sulphur Creek	500	67 (0.99)	1.0	0.92 (0.26)	High	Moderate	High
	Marsh Creek	500	253 (0.27)	1.0	1.21 (0.24)	High	Low	High
	Bear Valley Creek	750	474 (0.27)	1.0	1.37 (0.17)	High	Low	High
Upper Salmon River	Salmon Lower main	2000	108 (0.18)	1.0	1.18 (0.17)	High	Low	High
	Salmon upper main	1000	411 (0.18)	0.7	1.22 (0.19)	High	Low	High
	Pahsimeroi River	1000	267 (0.24)	0.93	1.37 (0.2)	High	High	High
	Lemhi River	2000	143 (0.18)	1.0	1.3 (0.23)	High	High	High
	Valley Creek	500	121 (0.18)	1.0	1.45 (0.15)	High	Moderate	High
	Salmon EF	1000	347 (0.24)	1.0	1.08 (0.28)	High	High	High
	Yankee Fork	500	44 (0.18)	0.39	0.72 (0.39)	High	High	High
	North Fork	500	Insufficient data				Low	High
	Panther Creek	750	Extirpated					

Baseline Fisheries' Effects

Spring/summer Chinook salmon have not been incidentally handled or killed in Fall Chinook or coho salmon fisheries in the Snake River because of differences in species' run timing. Spring/summer Chinook salmon pass Lower Granite Dam in the spring and early summer months, while fall Chinook and coho salmon run in the fall.

Although many larger streams open to resident trout fishing contain rearing spring/summer Chinook, incidental mortality of juvenile spring/summer Chinook salmon is limited because the rearing juvenile Chinook salmon are small during the trout season. In 2009, ODFW instituted maximum hook size regulations in the Imnaha and Lostine Rivers, which are designed to severely reduce an angler's ability to catch Chinook salmon while trout angling (Oregon Sport Fishing Regulations). Occasionally adult spring Chinook are hooked by trout anglers, but few are landed.

Angler access to spawning areas for listed spring/summer Chinook salmon is likely limited. Spring/summer Chinook salmon spawn in late summer and the spawning rivers are frozen during much of the incubation period. In addition, most important spawning and rearing areas where natural-origin, ESA-listed spring/summer Chinook salmon spawn are outside the proposed fishery areas. Although powerboat use can disturb fish or eggs in shallow water, powerboat use for fishing does not occur in areas where spring/summer Chinook salmon spawn in shallow water.

3.2.2. Snake River Fall Chinook Salmon

On June 3, 1992, NMFS listed the Snake River fall-run Chinook Salmon ESU as a threatened species (57 FR 23458). More recently, the threatened status was reaffirmed on June 28, 2005 (70 FR 37160) and on April 14, 2014 (79 FR 20802). Critical habitat was designated on December 28, 1993 (58 FR 68543).

The Snake River fall-run Chinook Salmon ESU includes naturally spawned fish in the lower mainstem of the Snake River and the lower reaches of several of the associated major tributaries including the Tucannon, the Grande Ronde, Clearwater, Salmon, and Imnaha Rivers, along with 4 artificial propagation programs (Jones Jr. 2015; NWFSC 2015). None of the hatchery programs are excluded from the ESU. As explained above by NMFS (2005), genetic resources can be housed in a hatchery program but for a detailed description of how NMFS evaluates and determines whether to include hatchery fish in an ESU or DPS, see (NMFS 2005). Table 6 lists the natural populations and hatchery programs included in the ESU.

Table 6. Snake River Fall-Run Chinook Salmon ESU description (Jones Jr. 2015; NWFSC 2015).

ESU Description	
Threatened	Listed under ESA in 1992; updated in 2014
Major Population Group	***Extant Population***
Snake River	Lower Snake River
Artificial production	
Hatchery programs included in ESU	Lyons Ferry NFH fall, Acclimation Ponds Program fall, Nez Perce Tribal Hatchery fall, Idaho Power fall.
Hatchery programs not included in ESU	Not applicable

Two historical populations (1 extirpated) within one MPG comprise the Snake River fall-run Chinook Salmon ESU. The extant natural population spawns and rears in the mainstem Snake River and its tributaries below Hells Canyon Dam. Figure 4 shows a map of the ESU area. The decline of this ESU was due to heavy fishing pressure beginning in the 1890s and loss of habitat with the construction of Swan Falls Dam in 1901 and the Hells Canyon Complex from 1958 to 1967, which extirpated one of the historical populations. Hatcheries mitigating for losses caused by the dams have played a major role in the production of Snake River fall-run Chinook salmon since the 1980s (NMFS 2012).

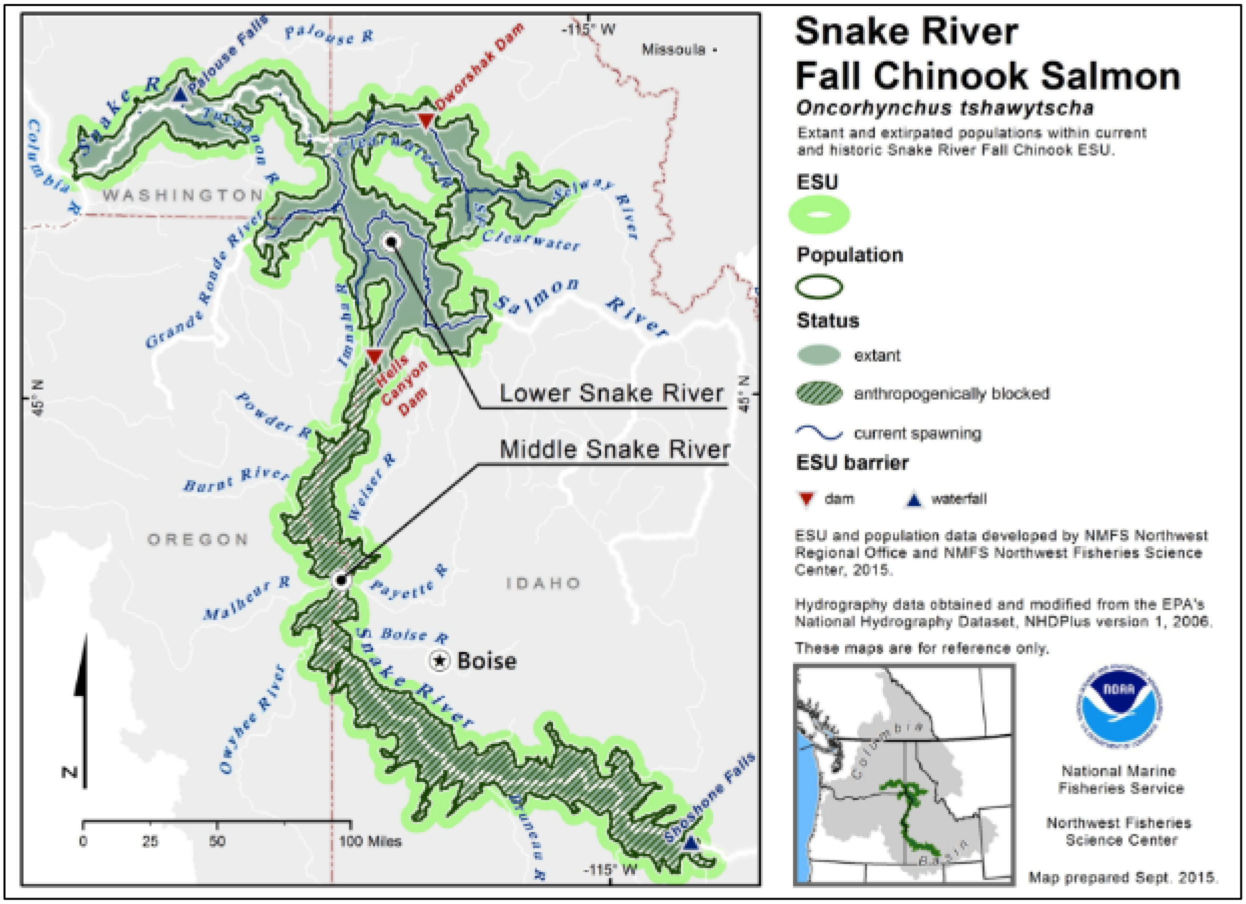

Figure 5. Map of the Snake River Fall-Run Chinook Salmon ESU's spawning and rearing areas, illustrating populations and MPGs (NWFSC 2015).

Snake River fall-run Chinook salmon spawning and rearing occurs primarily in larger mainstem rivers, such as the Salmon, Snake, and Clearwater Rivers. Historically, the primary fall-run Chinook salmon spawning areas were located on the upper mainstem Snake River (Connor et al. 2005). Now, a series of Snake River mainstem dams block access to the Upper Snake River and about 85% of ESU's spawning and rearing habitat. Swan Falls Dam, constructed in 1901, was the first barrier to upstream migration in the Snake River, followed by the Hells Canyon Complex beginning with Brownlee Dam in 1958, Oxbow Dam in 1961, and Hells Canyon Dam in 1967. The ESU is also impacted by eight mainstem dams (four on the Columbia River and four in the lower Snake River). Natural spawning is currently limited to the Snake River from the upper end of Lower Granite Dam to Hells Canyon Dam; the lower reaches of the Imnaha, Grande Ronde, Clearwater, Salmon, and Tucannon Rivers; and small areas in the tailraces of the Lower Snake River hydroelectric dams (Good et al. 2005).

Some fall-run Chinook salmon also spawn in smaller streams such as the Potlatch River, and Asotin and Alpowa Creeks and they may be spawning elsewhere. The vast majority of spawning today occurs upstream of Lower Granite Dam, with the largest concentration of spawning sites in the mainstem Snake River (about 60%) and in the Clearwater River, downstream from Lolo Creek (about 30%) (NMFS 2012).

Abundance, Productivity, Spatial Structure, and Diversity

Status of the species is determined based on the abundance, productivity, spatial structure, and diversity of its constituent natural populations. Best available information indicates that the Snake River fall-run Chinook Salmon ESU remains at threatened status (NWFSC 2015).

The NMFS Snake River fall-run Chinook Recovery Plan (NMFS 2017a) proposes that a single population recovery scenario could be possible given the unique spatial complexity of the Lower Mainstem Snake River fall-run Chinook salmon population; the recovery plan notes that such a scenario could be possible if major spawning areas supporting the bulk of natural returns are operating consistent with long-term diversity objectives in the proposed plan. Under this single population scenario, the requirements for a sufficient combination of natural abundance and productivity could be based on a combination of total population natural abundance and relatively high production from one or more major spawning areas with relatively low hatchery contributions to spawning, i.e., low hatchery influence for at least one major natural spawning production area.

The overall current risk rating for the Lower Mainstem Snake River fall-run Chinook salmon population is viable. The overall risk rating is based on a low risk rating for abundance/productivity (A/P) and a moderate risk rating for spatial structure/diversity (SS/D). The geometric mean natural-origin fish abundance obtained from the most recent 10 years of annual spawner escapement estimates is 6,418 fish. While natural-origin spawning levels are above the 4,200 minimum abundance threshold for recovery, and estimated productivity is also high, neither measure is high enough to achieve the very low risk rating needed for recovery of a one-population ESU (NWFSC 2015). The most recent status review used the ICTRT simple 20-year recruits per spawner (R/S) method to estimate the current productivity for this population (1990-2009 brood years) and determined it was 1.5. Given remaining uncertainty and the current level of variability, the point estimate of current productivity would need to meet or exceed 1.70 to be rated at very low risk.

For spatial structure/diversity, the moderate risk rating was driven by changes in major life-history patterns, shifts in phenotypic traits, and high levels of genetic homogeneity detected in samples from natural-origin returns. In particular, the rating reflects the relatively high proportion of within-population hatchery spawners in all major spawning areas and the lingering effects of previous high levels of out-of-ESU strays. In addition, the potential for selective pressure imposed by current hydropower operations and cumulative harvest impacts contribute to the current rating level (NWFSC 2015).

The 10-year geometric mean annual spawning escapement estimate for Snake River fall Chinook salmon is 6,418, which exceeds its minimum abundance threshold for recovery by 50 percent (NWFSC 2015). The minimum abundance threshold is the abundance level adequate for compensatory processes to operate and for maintenance of within-population spatial structure (ICTRT 2007). In addition, populations that, on average, meet or exceed their minimum abundance thresholds are resilient to environmental and anthropogenic disturbances, maintain genetic diversity, and support/provide ecosystem functions. The 2015 5-year status review assessment (NWFSC 2015) and the life-cycle modeling efforts that are underway for Snake River fall Chinook salmon (Perry et al. 2017) have found stronger evidence of density-dependent effects in the Lower Snake River fall Chinook salmon population. More study is needed to better understand the causal mechanisms and extent of these effects.

Baseline Fisheries' Effects

Since Snake River fall Chinook salmon were originally listed in 1992, fishery impacts have been reduced in both ocean and river fisheries. Total exploitation rate has been relatively stable in the range of 40% to 50% since the mid-1990s (NWFSC 2015).

There are currently ongoing fall Chinook recreational fisheries for adipose fin-clipped ESA-listed Snake River fall Chinook salmon. The mortalities of fall Chinook reported in Tables 7 and 8 below are from Nez Perce treaty fisheries and those non-treaty sport fisheries conducted by the states of Oregon, Washington and Idaho. Harvest of hatchery-origin fall Chinook salmon across all parties has averaged about 1,086 fish from 2010-2017 (Table 7). This value averages about 4% of the hatchery-origin fish that cross Lower Granite Dam. Capture of hatchery-origin fish would consider this harvest, in addition to unmarked hatchery fish that are caught and released, which has averaged about 1,189 fish from 2010-2017 (IDFG 2019b). This results in about a 9% encounter rate with hatchery-origin fall Chinook salmon that cross Lower Granite Dam. During these same years, incidental mortality from the states recreational fisheries and harvest from the tribal fisheries on natural-origin fall Chinook has averaged 358 fish, or about 3% of the natural-origin fish that cross Lower Granite Dam. Capture of natural-origin salmon is ten times the estimated mortality attributed to the state fisheries due to a 10% catch and release mortality rate (IDFG 2019b), plus the tribal mortality, about 1,271 fish on average, and 11% of the natural-origin fish that cross Lower Granite Dam.

Table 7. Harvest of hatchery-origin fall Chinook salmon in state and tribal fisheries from 2010-2017.

Year	Hatchery-origin fall Chinook salmon at LGD	State Mortalities	Tribal Mortalities	Total Mortalities	Mortality (%)	Escapement
2010	32,417	701	549	1250	4	31,167
2011	15,509	353	183	536	3	14,973
2012	19,058	512	299	811	4	18,247

2013	31,076	1,590	1,024	2,614	8	28,463
2014	38,444	815	309	1,124	3	37,320
2015	37,251	786	264	1,050	3	36,201
2016	23,383	466	491	957	4	22,426
2017	15,114	324	21	345	2	14,424
Average	25,497	693	393	1,086	4	24,411

Sources: (IDFG 2019b; Oatman 2017)

Table 8. Mortality of natural-origin fall Chinook salmon in state fall Chinook salmon and tribal fisheries from 2010-2017.

Year	Natural-origin fall Chinook salmon at LGD	State Mortalities	Tribal	Total Mortalities	Mortality (%)	Escapement
2010	7,347	72	110	182	2	7,171
2011	8,072	34	108	142	2	7,920
2012	11,306	96	139	235	2	11,065
2013	20,132	261	458	719	4	19,400
2014	11,899	89	435	524	4	11,375
2015	15,034	112	522	634	4	14,400
2016	8,762	59	333	392	4	8,370
2017	6,134	33	0	33	0.4	6,101
Average	11,086	95	263	358	3	10,728

Sources: (IDFG 2019b; Oatman 2017)

Only a few reports are available that provide empirical evidence showing what the catch and release mortality rate is for Chinook salmon in freshwater recreational fisheries. Oregon Department of Fish and Wildlife estimates a per-capture hook-and-release mortality for wild spring Chinook in Willamette River fisheries of 8.6% (Schroeder et al. 2000 in Lindsay et al. 2004), which is similar to a mortality of 7.6% reported by Bendock and Alexandersdottir (1993) in the Kenai River, Alaska. Although a more recent study by Lindsay et al. (2004) found that for wild Willamette spring Chinook salmon hooking mortality was 12.2%, the temperatures in the Willamette during the spring fishery are likely warmer than for a fall fishery in the Snake River; and studies have shown that hooking mortality increases with warmer water temperatures (Muoneke and Childress 1994). Based on the available data, state fishery managers use a 10% rate when evaluating impacts of proposed recreational fisheries.

Fall Chinook salmon spawn in the mainstem of the Clearwater and Snake Rivers, which results in overlap with the proposed fall Chinook and coho salmon fisheries in both time and space. This could result in adverse effects on spawning fall Chinook salmon through disturbance/harassment of actively spawning fish, as well as disturbance/trampling of redds. Fall Chinook salmon spawn in areas where powerboats are used. Although fall Chinook typically spawn in deeper water and larger substrate, in some areas of the Snake and Clearwater Rivers, redds can be located in pool tailouts or runsthat may make them more vulnerable to powerboat effects such as fish avoidance or red disturbance (NPT, personal communication, August 6, 2019).

There are currently ongoing coho fisheries that may impact ESA-listed Snake River fall Chinook salmon. However, because both fisheries' are overlapping, and most anglers are likely to fish for both species. The impacts on fall Chinook salmon are likely captured in the estimates provided above for the fall Chinook salmon fisheries.

There are currently ongoing resident trout fisheries that could also have incidental impacts on ESA-listed Snake River fall Chinook salmon ESU. ODFW, estimates these are likely small in scale due to maximum hook requirements that limit impacts on adults. Furthermore, most fall Chinook salmon spawn in the mainstem and Clearwater Rivers; the majority of resident trout fishing takes place in the Snake River tributary Rivers in Oregon. Thus, there is likely a great degree of spatial separation between resident trout and rearing fall Chinook salmon.

3.2.3. Snake River Steelhead

On August 18, 1997, NMFS listed the Snake River Steelhead DPS as a threatened species (62 FR 43937). The threatened status was reaffirmed in 2006 and most recently on April 14, 2014 (79 FR 20802). Critical habitat for the DPS was designated on September 2, 2005 (70 FR 52769).

The Snake River Steelhead DPS includes all naturally spawned anadromous *O. mykiss* originating below natural and manmade impassable barriers in streams in the Snake River Basin of southeast Washington, northeast Oregon, and Idaho (Figure 5) (NWFSC 2015). Twenty four extant historical populations within six MGPs comprise the Snake River Basin Steelhead DPS. Inside the geographic range of the DPS, 12 hatchery steelhead programs are currently operational. Five of these artificial programs are included in the DPS (Table 9) (Jones Jr. 2015). For a detailed description of how NMFS evaluates and determines whether to include hatchery fish in an ESU or DPS, see NMFS (2005).

Table 9. Snake River Basin Steelhead DPS description and MPGs (Jones Jr. 2015; NMFS 2012; NWFSC 2015).

DPS Description	
Threatened	Listed under ESA as threatened in 1997; updated in 2014.
Major Population Groups (6)	***Extant Populations (26)***
Grande Ronde	Joseph Creek, Upper Mainstem, Lower Mainstem, Wallowa River
Imnaha River	Imnaha River

DPS Description	
Clearwater	Lower Mainstem River, North Fork Clearwater, Lolo Creek, Lochsa River, Selway River, South Fork Clearwater
Salmon River	Little Salmon/Rapid, Chamberlain Creek, Secesh River, South Fork Salmon, Panther Creek, Lower MF, Upper MF, North Fork, Lemhi River, Pahsimeroi River, East Fork Salmon, Upper Mainstem
Lower Snake	Tucannon River, Asotin Creek
Hells Canyon Tributaries	Extirpated
Artificial production	
Hatchery programs included in DPS	Tucannon River summer, Little Sheep Creek summer, EF Salmon River Natural A, Dworshak NFH B, SF Clearwater (Clearwater Hatchery) B, Salmon River B
Hatchery programs not included in DPS	Lyons Ferry NFH summer, Wallowa Hatchery summer, Hells Canyon A, Pahsimeroi Hatchery A, Upper Salmon River A, Streamside Incubator Project A and B, Little Salmon River A

Snake River steelhead exhibit two distinct morphological forms, identified as “A-Index” and “B-Index” fish, which are distinguished by differences in body size, run timing, and length of ocean residence. B-Index fish predominantly reside in the ocean for 2 years, while A-Index steelhead typically reside in the ocean for 1-year (NMFS 2017b). As a result of different ocean residence times, B-Index steelhead are generally larger than A-Index fish. The smaller size of A-Index adults allows them to spawn in smaller headwater streams and tributaries. The differences in the two fish stocks represent an important component of phenotypic and genetic diversity of the Snake River Basin Steelhead DPS through the asynchronous timing of ocean residence, segregation of spawning in larger and smaller streams, and possible differences in the habitats of the fish in the ocean (NMFS 2012).

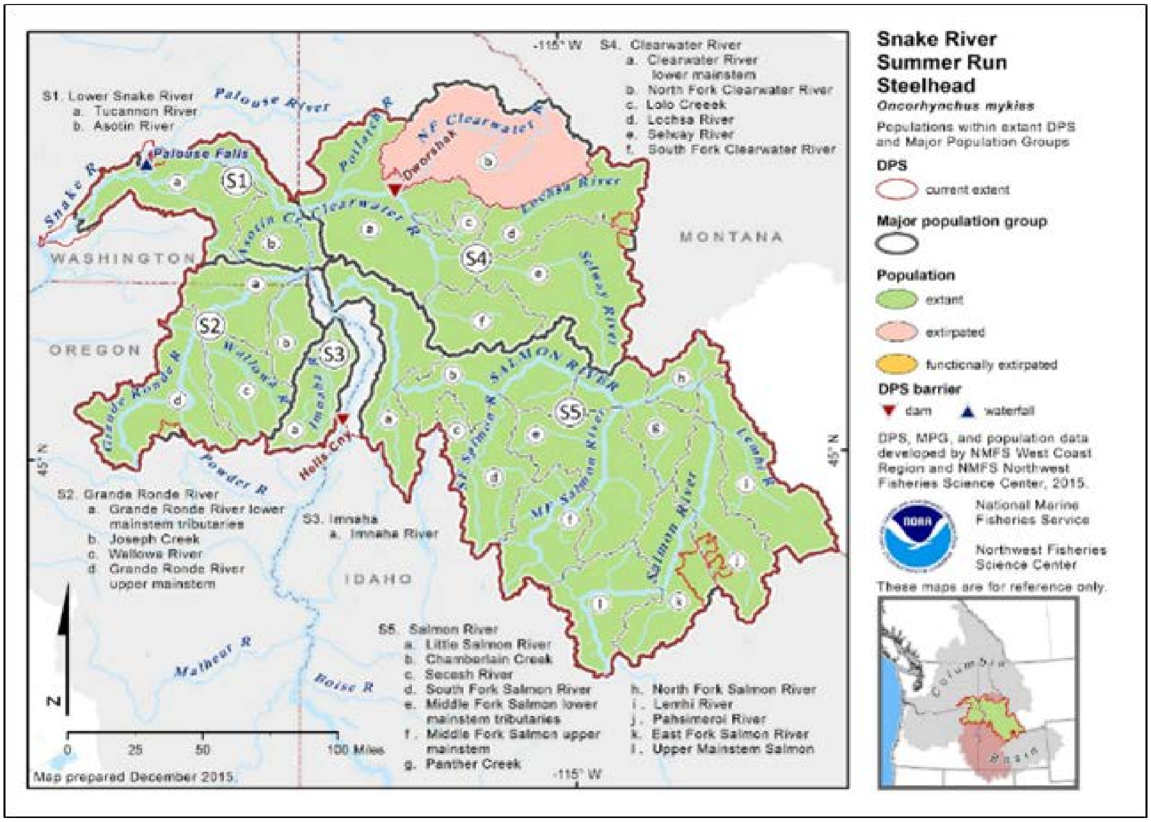

Figure 6. Map of the Snake River Basin Steelhead DPS's spawning and rearing areas, illustrating natural populations and MPGs (NWFSC 2015).

Like all salmonid species, steelhead are cold-water fish (Magnuson et al. 1979) that survive in a relatively narrow range of temperatures, which limits the species distribution in fresh water to northern latitudes and higher elevations. Snake River Basin steelhead migrate a substantial distance from the ocean (up to 930 miles) and occupy habitat that is considerably warmer and drier (on an annual basis) than steelhead of other DPSs. Adult Snake River steelhead return to the Snake River Basin from late summer through fall, where they hold in larger rivers for several months before moving upstream into smaller tributaries, and are generally classified as summer-run (NMFS 2012; NMFS 2013).

Steelhead live primarily off stored energy during the holding period, with little or no active feeding (Laufle et al. 1986; Shapovalov and Taft 1954). Adult dispersal toward spawning areas varies with elevation, with the majority of adults dispersing into tributaries from March through May, with earlier dispersal at lower elevations, and later dispersal at higher elevations. Spawning begins shortly after fish reach spawning areas, which is typically during a rising hydrograph and prior to peak flows (NMFS 2012; Thurow 1987).

Abundance, Productivity, Spatial Structure, and Diversity

Status of the species is determined based on the abundance, productivity, spatial structure, and diversity of its constituent natural populations. Best available information indicates that the Snake River Steelhead DPS, ranges from moderate to high risk and remains at threatened status (NWFSC 2015). A great deal of uncertainty remains regarding the relative proportion of hatchery-origin fish in natural spawning areas near major hatchery release sites.

Direct counts of steelhead abundance by population are generally not available for Snake River steelhead due to difficulties conducting surveys in much of their range when steelhead move into their spawning tributaries. However, most populations are thought to be maintained, meaning they exist at levels providing ecological and evolutionary function to the DPS as a whole (ICTRT 2007; NWFSC 2015). For those populations where information is known, productivity is above replacement (i.e., when the number of offspring are equivalent to the number of parents, or 1) and abundance is close to or exceeds the MAT values, which are the values required for the population to meet the full range of criteria for a viable salmonid population. These values were derived by assuming a replacement rate of 1, and considering available spawning habitat (ICTRT 2007). Information on the distribution of natural returns among stock groups and populations indicates that differences in abundance/productivity status among populations may be more related to habitat conditions such as geography or elevation rather than the morphological forms of A-run versus B-run (NWFSC 2015).

The ICTRT viability criteria adopted in the Snake River Management Unit Recovery Plans include spatial explicit criteria and metrics for both spatial structure and diversity. With one exception, spatial structure ratings for all of the Snake River Basin steelhead populations were low or very low risk, given the evidence for distribution of natural production with populations. The exception was the Panther Creek population, which was given a high risk rating for spatial structure based on the lack of spawning in the upper sections. No new information was provided for the 2015 status update that would change those ratings (Table 10)(NWFSC 2015).

Updated information is available for two important factors that contribute to rating diversity risk under the ICTRT approach: hatchery spawner fractions and the life history diversity. Hatchery straying appears to be relatively low. At present, direct estimates of hatchery returns based on PBT analysis are available for the run assessed at Lower Granite Dam and at the hatchery rack (IDFG 2015). Furthermore, information from the Genetic Stock Identification (GSI) assessment sampling provide an opportunity to evaluate the relative contribution of B-Index returns within each stock group. No population fell exclusively into the B-Index size category, although there were clear differences among population groups in the relative contributions of the larger B-Index life history type (NWFSC 2015).

Table 10. Risk levels and viability ratings for Snake River steelhead Major Population Groups (MPGs) (NWFSC 2015). Data are from 2004-2015. ICTRT = Interior Columbia Technical Recovery Team. Current abundance and productivity estimates expressed as 10-year geometric means (standard error).

MPG	Population	ICTRT minimum threshold	Natural spawning abundance	Productivity	Abundance and productivity risk[1]	Spatial structure and diversity risk[1]	Overall risk viability rating[1]
Clearwater River	Lower Main	1500	2099 (0.15)	2.36 (0.16)	Moderate	Low	Maintained
	South Fork	1000	Insufficient data		High	Moderate	Maintained/High
	Lolo Creek	500	Insufficient data		High	Moderate	Maintained/High
	Selway River	1000	1650 (0.17)	2.33 (0.18)	Moderate	Low	Maintained
	Lochsa River	1000			Moderate	Low	Maintained
Salmon River	Little Salmon River	500	Insufficient data		Moderate	Moderate	Maintained
	South Fork	1000	1028 (0.17)	1.8 (0.15)	Moderate	Low	Maintained
	Secesh River	500			Moderate	Low	Maintained
	Chamberlain Creek	500	2213 (0.16)	2.38 (0.10)	Moderate	Low	Maintained
	Lower Middle Fork	1000			Moderate	Low	Maintained
	Upper Middle Fork	1000			Moderate	Low	Maintained
	Panther Creek	500	Insufficient data		Moderate	High	High
	North Fork	500	Insufficient data		Moderate	Moderate	Maintained
	Pahsimeroi River	1000	Insufficient data		Moderate	Moderate	Maintained
	East Fork	1000	Insufficient data		Moderate	Moderate	Maintained
	Upper Main	1000	Insufficient data		Moderate	Moderate	Maintained
	Lemhi	1000	Insufficient data		Moderate	Moderate	Maintained
Imnaha	Imnaha River	1000	Insufficient data		Moderate	Moderate	Maintained
Grande Ronde River	Lower Grande Ronde	1000	Insufficient data		Moderate	Moderate	Maintained
	Joseph Creek	500	1839	1.86	Very Low	Low	Low
	Upper Grande Ronde	1500	1649	3.15	Moderate	Moderate	Low
	Wallowa River	1000	Insufficient data		High	Moderate	Maintained
Lower Snake River	Tucannon River	1000	Insufficient data		High	Moderate	High
	Asotin Creek	500	Insufficient data		Moderate	Moderate	High

[1]Uncertain due to lack of data, only a few years of data, or large gaps in data series.

Baseline Fisheries' Effects

There are currently ongoing fall Chinook and coho fisheries without ESA authorization for incidental take of ESA-listed Snake River steelhead. However, any natural-origin steelhead incidentally killed during any fishery in the Action Area counts towards the newly established ESA limit (NMFS 2019c).

There are currently ongoing resident trout fisheries without ESA authorization for incidental take of ESA- listed Snake River steelhead. Several specific trout fishing regulation measures in place are designed to protect wild trout and natural origin juvenile steelhead. A late may trout season opening date and an 8-inch minimum length for trout protect juvenile steelhead from direct harvest. The bulk of steelhead smolts are well on their seaward migration prior to the end of May and few achieve eight inches in length prior to the end of trout season the prior fall. As a result, trout fishery impacts to juvenile steelhead are generally limited to catch and release of under sized fish.

Angler access to spawning areas for listed steelhead is likely limited. Steelhead spawn in the spring at the start of spring runoff and most of the egg incubation takes place in high flows. In addition, most important spawning and rearing areas where natural-origin, ESA-listed steelhead spawn are outside the proposed fishery areas. Although powerboat use can disturb fish or eggs in shallow water, powerboat use for fishing does not occur in areas where steelhead spawn in shallow water.

3.2.4. Snake River Sockeye Salmon

On April 5, 1991, NMFS listed the Snake River Sockeye Salmon ESU as an endangered species (56 FR 14055) under the Endangered Species Act (ESA). This listing was affirmed in 2005 (70 FR 37160), and again on April 14, 2014 (79 FR 20802). Critical habitat was designated on December 28, 1993 (58 FR 68543) and reaffirmed on September 2, 2005.

The ESU includes naturally spawned anadromous and residual sockeye salmon originating from the Snake River Basin in Idaho, as well as artificially propagated sockeye salmon from the Redfish Lake captive propagation program (Jones Jr. 2015)(Figure 6). There is a single MPG comprised of five historical populations; four populations have been extirpated (Table 11).

Table 11. Snake River Sockeye Salmon ESU description (Jones Jr. 2015; NMFS 2015).

ESU Description	
Threatened	Listed under ESA in 1991; updated in 2014.
Major Population Group	***Extant Population***
Sawtooth Valley Sockeye	Redfish Lake
Artificial production	

ESU Description	
Hatchery programs included in ESU	Redfish Lake Captive Broodstock
Hatchery programs not included in ESU	Not applicable

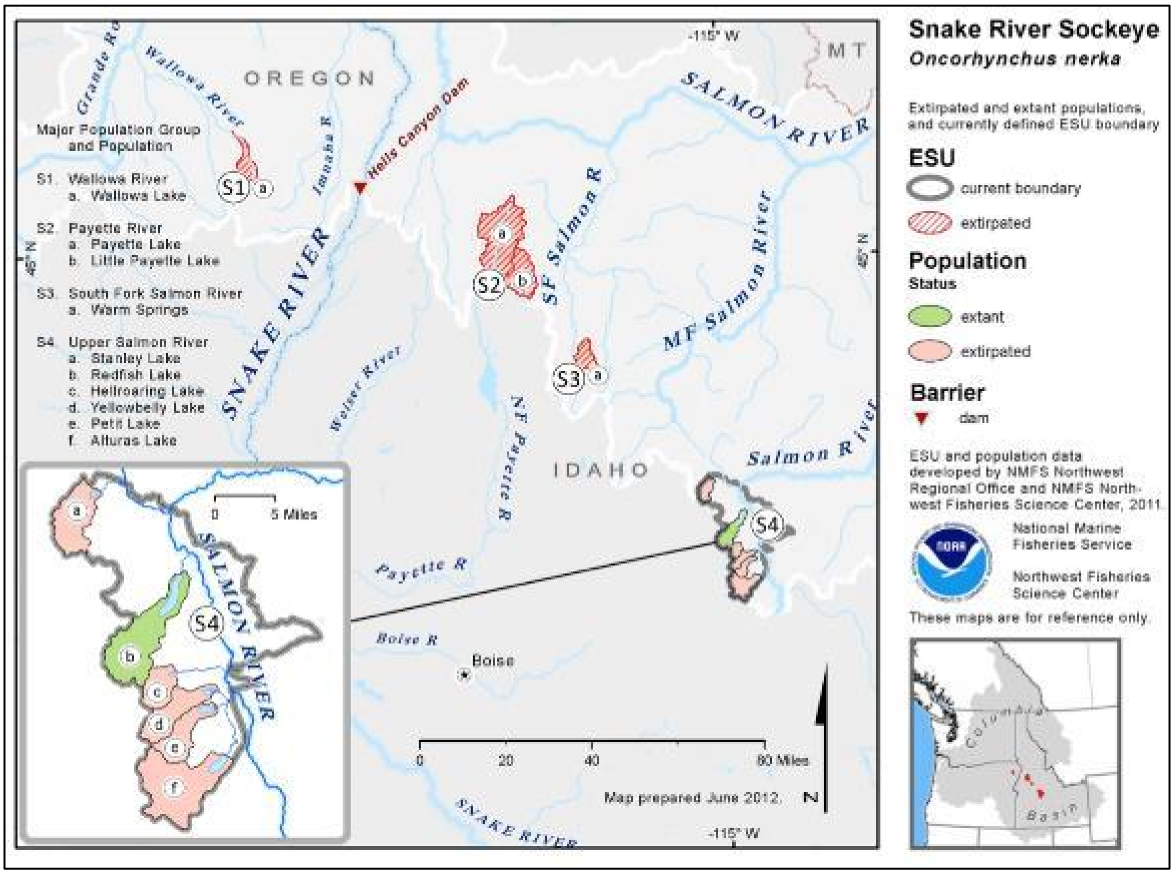

Figure 7. Map of the Snake River Sockeye Salmon ESU's spawning and rearing areas, illustrating populations and MPGs (NWFSC 2015).

Abundance, Productivity, Spatial Structure, and Diversity

Status of the species is determined based on the abundance, productivity, spatial structure, and diversity of its constituent natural populations. Best available information indicates that the Snake River Sockeye Salmon ESU is at high risk and remains at endangered status. Although the endangered Snake River Sockeye Salmon ESU has a long way to go before it will meet the biological viability criteria (i.e., indication that the ESU is self-sustaining and naturally producing), annual returns of sockeye salmon through 2018 show that more fish are returning than before initiation of the captive broodstock program which began soon after the initial ESA listing (Table 12). Adult returns in the last six years have ranged from a high of 1,579 fish in

2014 (including 453 natural-origin fish) to a low of 114 adults in 2018 (including 13 natural-origin fish).

Table 12. Hatchery- and natural-origin sockeye salmon returns to Sawtooth Valley, 1999-2018 (Christine Kozfkay, IDFG, personal communication, March 4, 2019).

Return Year	Total Return	Natural Return	Hatchery Return	Alturas Return[1]	Observed Not Trapped
1999	7	0	7	0	0
2000	257	10	233	0	14
2001	26	4	19	0	3
2002	22	6	9	1	7
2003	3	0	2	0	1
2004	27	4	20	0	3
2005	6	2	4	0	0
2006	3	1	2	0	0
2007	4	3	1	0	0
2008	646	140	456	1	50
2009	832	86	730	2	16
2010	1,355	178	1,144	14	33
2011	1,117	145	954	2	18
2012	257	52	190	0	15
2013	272	79	191	0	2
2014	1,579	453	1,062	0	63
2015	91	14	77	0	0
2016	574	33	539	0	24
2017	176	11	151	0	14
2018	114	13	100	0	1

[1] These fish were assigned as sockeye salmon returns to Alturas Lake and are included in the natural return numbers.

The large increases in returning adults in recent years reflect improved downstream and ocean survivals, as well as increases in juvenile production, starting in the early 1990s. Although total sockeye salmon returns to the Sawtooth Valley in recent years have been high enough to allow for some level of natural spawning in Redfish Lake, the hatchery program remains at its initial phase with a priority on genetic conservation and building sufficient returns to support sustained outplanting and recolonization of the species historic range (NMFS 2015; NWFSC 2015).

Furthermore, there is evidence that the historical Snake River Sockeye Salmon ESU included a range of life history patterns, with spawning populations present in several of the small lakes in the Sawtooth Basin (NMFS 2015). Historical production from Redfish Lake was likely associated with a lake shoal spawning life history pattern although there may have also been some level of spawning in Fish Hook Creek (NMFS 2015; NWFSC 2015). In NMFS' 2011 status review update for Pacific salmon and steelhead listed under the ESA (Ford et al. 2011), it was not possible to quantify the viability ratings for Snake River sockeye salmon. Ford et al. (2011) determined that the Snake River sockeye salmon captive broodstock-based program has made substantial progress in reducing extinction risk, but that natural production levels of anadromous returns remain extremely low for this species (NMFS 2012).

In the most recent 2015 status update, NMFS determined that at this stage of the recovery efforts, the ESU remains at high risk for both spatial structure and diversity (NWFSC 2015). At present, anadromous returns are dominated by production from the captive spawning component. The ongoing reintroduction program is still in the phase of building sufficient returns to allow for large scale reintroduction into Redfish Lake, the initial target for restoring natural program (NMFS 2015). There is some evidence of very low levels of early timed returns in some recent years from out-migrating naturally produced Alturas Lake smolts. At this stage of the recovery efforts, the ESU remains rated at high risk for spatial structure, diversity, abundance, and productivity (NWFSC 2015).

Baseline Fisheries' Effects

There are currently ongoing fall Chinook and coho fisheries without ESA authorization for incidental take of ESA-listed Snake River sockeye salmon. However, fall Chinook fisheries would rarely encounter Snake River sockeye (< 10 encounters annually). Coho salmon fisheries would not intercept Snake River sockeye because of the fishery locations and run timing differences.

There are currently ongoing resident trout fisheries in Oregon without ESA authorization for incidental take of ESA-listed Snake River sockeye salmon. However, resident trout fisheries in Oregon do not intercept Snake River sockeye because of the fishery locations.

Angler access to spawning areas for listed sockeye salmon is likely limited. This is because sockeye salmon spawning and rearing areas are outside the proposed fishery areas. Although powerboat use can disturb fish or eggs in shallow water, powerboat use for fishing does not occur in areas where sockeye salmon spawn.

3.2.5. Bull trout

The USFWS listed bull trout (*Salvelinus confluentus*) as threatened under the ESA in June 1998 (63 FR 31647). The USFWS published a proposed critical habitat rule on January 14, 2010 (75 FR 2260) and a final rule on October 18, 2010 (75 FR 63898), effective November 17, 2010. The designation involved the species' coterminous range within the Coastal, Klamath, Mid-Columbia, Columbia Headwaters, Upper Snake, and St. Mary recovery units. Rangewide, the

Service designated reservoirs/lakes and stream/shoreline miles in 32 critical habitat units (CHU) as bull trout critical habitat. Designated bull trout critical habitat is of two primary use types: (1) spawning and rearing; and (2) foraging, migrating, and overwintering.

Bull trout are members of the family Salmonidae and are char native to Washington, Oregon, Idaho, Nevada, Montana and western Canada. Compared to other salmonids, bull trout have more specific habitat requirements that appear to influence their distribution and abundance. They need cold water to survive, so they are seldom found in waters where temperatures exceed 59 to 64 degrees (F). They also require stable stream channels, clean spawning and rearing gravel, complex and diverse cover, and unblocked migratory corridors.

The Mid-Columbia Recovery Unit (RU) is located within eastern Washington, eastern Oregon, and portions of central Idaho. The Mid-Columbia RU is divided into four geographic regions: Lower Mid-Columbia, Upper Mid-Columbia, Lower Snake, and Mid-Snake Geographic Regions. The Mid-Columbia RU contains 24 occupied core areas comprising 142 local populations, two historically occupied core areas, one research needs area, and seven Foraging Migration and Overwinter habitats (USFWS 2015a). The Upper Snake RU is located in central Idaho, northern Nevada, and eastern Oregon. The Upper Snake RU is divided into seven geographic regions: Salmon River, Boise River, Payette River, Little Lost River, Malheur River, Jarbidge River, and Weiser River. The Upper Snake RU contains 22 core areas and 207 local populations, with almost 60 percent being present in the Salmon River Region (USFWS 2015b).

The current condition of the bull trout in the project area is attributed to the adverse effects of climate change, agricultural practices (e.g., irrigation, water withdrawals, livestock grazing), fish passage (e.g. dams, culverts), nonnative species, forest management practices, and mining. Conservation measures or recovery actions implemented include road removal, channel restoration, mine reclamation, improved grazing management, removal of fish barriers, and in-stream flow requirements (USFWS 2015a).

Baseline Fisheries' Effects

The ongoing fall Chinook and coho salmon and resident trout fisheries could also impact bull trout. In a recently completed Biological Opinion on the impacts of all Snake River Basin fisheries in anadromous waters on bull trout, the USFWS estimates that approximately 4,000 bull trout annually would be incidentally captured (USFWS 2019). Of the total number of bull trout that would be captured and released, up to 200 bull trout annually would suffer mortality. This represents less than 1 percent of the estimated 34,327 adult bull trout in project area (USFWS 2019). Subadult bull trout are also likely to be incidentally captured during the ongoing fisheries. In Idaho, there are an estimated 1.13 million adult and subadult bull trout (High et al. 2008). Given the estimated number adult bull trout, the USFWS determined that 9 percent of the population within the project area may be incidentally captured annually during the ongoing fisheries, and 0.04 percent may suffer mortality. When subadult bull trout are included in these calculations, the percentages are much lower. For example, in the Salmon River basin High et al. (2008) estimated the abundance of adult and subadult bull trout to be 0.64 million.

3.2.6. Other Non-Listed Fish Species

Coho Salmon

Upriver coho are native to the Snake River Basin, but were extirpated in 1986. Programs for reintroduction of upriver coho in the Snake River Basin are ongoing. For fishery management, there are two primary geographic groups of Columbia River coho; Lower River and upriver coho salmon. Bonneville Dam in the mainstem Columbia River divides the Lower Columbia River coho and upriver coho. Substantial hatchery coho salmon production occurs above Bonneville Dam (upriver coho). Coho salmon returns to the Snake River Basin can be estimated by annual adult counts at Lower Granite Dam and run reconstructions. Lower Granite Dam counts indicate peak Coho salmon escapement in recent history was 18,651 adult fish in 2014. The 2008-2017 average for adult returns is 5,369 adult fish (range 1,668 to 18,651 fish) (Nez Perce Tribe 2018).

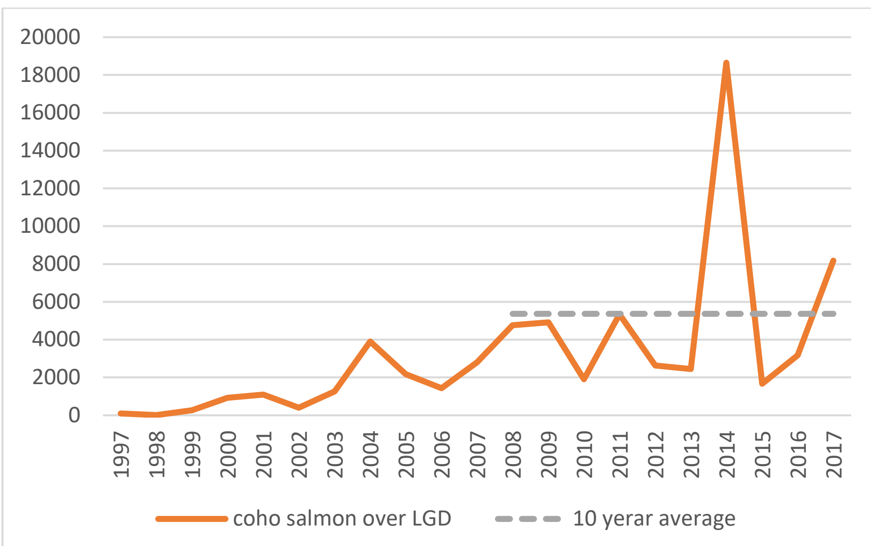

Figure 8. Coho salmon escapement above Lower Granite Dam (1997-2017).

Coho Salmon Baseline Fisheries' Effects

The 2008-2017 average number of coho salmon adults passing Lower Granite Dam was 4,975 fish[4]. In 2014 and 2017, less than 200 coho salmon were caught by Idaho anglers in recreational fisheries (Don Whitney, IDFG, personal communication). Fisheries in Oregon and Washington have not occurred to date. The NPT fishery has caught between 11 and 600 coho from 2010-2016, with an average of 295 fish. Encounters of coho salmon in the resident trout fisheries in Oregon are likely small in number because coho salmon have been considered extirpated until recently, with the first releases of juvenile coho salmon occurring in the Lostine River in 2014.

[4] Fish Passage Center. Accessed on October 15, 2018

In addition, coho run timing only overlaps with the resident trout fishery for about two months from September to October.

Other Fish Species

Approximately 60 other species of fish live in the Snake River and its tributaries. About one-half are native species, primarily of the families Salmonidae (e.g., rainbow trout, whitefish), Catastomidae (e.g., suckers), Cyprinidae (e.g., northern pikeminnow), and Cottidae (e.g., sculpins). Fish from these families may be encountered and a few may be incidentally taken in the proposed fisheries.

The other native fish are not likely to be encountered in the proposed fisheries but may interact with salmon and resident trout ecologically through predator or prey relationships. For example, White sturgeon (*Acipenser transmontanus*) occur in the mainstems of the Snake and Salmon Rivers, but are rarely encountered in the proposed fisheries because the gear and fishing methods for sturgeon are different than for the proposed fisheries. Margined sculpin (*Cottus marginatus*) prey on eggs and on juvenile salmon, steelhead and resident trout. Other species, such as leopard dace (*Rhinichthys falcatus*) and Umatilla dace (*Rhinichthys umatilla*), may serve as prey for salmon and resident trout. These species are not likely to be encountered in the proposed fisheries.

The Snake River Basin also supports at least 25 introduced species, primarily representing the taxonomic families Percidae, Centrarchidae, and Ictaluridae (Simpson and Wallace 1978). Most of the introduced species are classified as game fish by IDFG. Introduced species such as smallmouth bass (*Micropterus dolomieu*) and largemouth bass (*Micropterus salmoides*), would not likely be harvested in proposed fisheries due to differences in fishing gear requirements and habitat preferences for these species.

Other Fish Species Baseline Fisheries' Effects

The proposed fall Chinook salmon, coho salmon and resident trout fisheries could incidentally impact other fish species. However, encounters are likely to be small in number because of fishing gear that is designed to target salmon and trout, and fall salmon fisheries that operate only a few months a year.

3.3. VEGETATION

Fisheries can affect vegetation when new angler access points are created. Angler may clear away or trample vegetation to gain better river access. The magnitude of the effect depends on the relative abundance of fishermen per unit of area; high abundances will likely lead to greater effects. However, fishermen typically access riverbanks through well-established access points.

ESA-listed plants in the project area include Spalding's catchfly (*Silene spaldingii*) and MacFarlane's four o'clock (*Mirabilis macfarlanei*), both listed as threatened under the ESA.

While these plants are in the project area, they occur primarily in bunchgrass grasslands, sagebrush-steppe, open pine communities, steep river canyon grassland habitats, or mesic, alkaline habitats in the project area. Access points for steelhead fishing occur away from these habitats. Therefore, there is little or no likelihood of anglers encountering listed plants or their habitats (Spalding's catchfly and MacFarlane's four o'clock) while fishing in the project area.

3.4. SOCIOECONOMICS

The *U.S. v. Oregon* FEIS describes status quo conditions for harvest and related economic values for commercial (tribal and non-tribal) and recreational fisheries on the Columbia River, and the contribution of these fisheries to affected regional economies. This section summarizes socioeconomic information found in Section 3.5 of the *U.S. v. Oregon* FEIS.

Recreational fisheries contribute to local economies through the purchase of fishing-related goods and supplies, and by the retention of local services, such as outfitter and guiding services. Sectors particularly affected by recreational fishing activities include food services, eating and drinking establishments, lodging, recreation services, and fueling stations. Expenditures on fishing-related goods and services by fishermen contribute to both local and non-local businesses.

One of the top economic boosters for Idaho's economy is hunting and recreational fishing, with the two outdoor activities bringing in roughly $1.02 billion in 2011[5]. According to the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (U.S. Fish and Wildlife Service 2011), recreational fisheries in Idaho contributed approximately $548 million in retail sales, and $230 million in wages and salaries for 7,252 jobs in 2011.

Similarly, in Washington State[6], fishermen, hunters and wildlife watchers contribute more than $6.7 billion a year to the state's economy, with recreational fisheries contributing $1.1 billion per year. According to estimates for the statewide economic contributions of recreational fishing by residents of each congressional district, the action area is part of the 4th and 5th congressional districts. Both districts combined in 2011 had 241,769 anglers, observed retail sales of over $238 million US Dollars, generating 3,243 jobs and over $125 million in salaries and wages (ASA 2019).

In Oregon State[7], residents and visitors spent $2.5 billion in fishing, hunting and wildlife viewing activities and equipment. According to estimates for the statewide economic contributions of recreational fishing by residents of each congressional district, the action area is part of the second congressional district. In 2011, this district had 113,877 anglers, observed retail sales of over $96 million US Dollars, generating 1,371 jobs and over $50 million in salaries

[5] Idaho sportsmen & women brochure
[6] Washington State report on recreational fishing
[7] Fishing, Hunting, Wildlife Viewing in Oregon

and wages (ASA 2019). According to information in the Mitchell Act FEIS (NMFS 2014b), about 52 percent (161,397 fish) of the annual average recreational harvest between 2002 and 2009 of salmon and steelhead in the Columbia River Basin (311,252 fish) occurred in the Lower Columbia River and tributaries. The recreational fisheries above Bonneville Dam, which account for the remainder of the harvest, are geographically widespread throughout the many tributaries in the upper Columbia River and Snake River, and are socially important.

Salmon and steelhead play a significant role in the ceremonial and subsistence cultural practices among Indian tribes in the project area. This important cultural resource may be affected by the alternatives analyzed in this EA. Salmon and steelhead have always been and will continue to be a core symbol and foundation of tribal identity, health, individual identity, culture, spirituality, religion, emotional well-being, and economy.

Salmon evoke sharing, gifts from nature, responsibility to the resource, and connection to the land and water. They represent the ability of Indian cultures to endure; they facilitate the transmission of tribal fishing culture to younger members, who are taught from an early age to fish and to understand their responsibility to the salmon and its habitat. The struggle to affirm and maintain the right to fish has made salmon an even more evocative symbol of tribal identity.

Salmon remain central in what is known as the first foods. The salmon was the first food to appear in early spring. First salmon ceremonies focus on thanking the fish for returning and assuring the entire community of a successful harvest. These ceremonies also draw attention to the responsibility Indian people have for providing a clean, welcoming, habitat for the returning fish. Family bands gathered along the Snake River and its tributaries at their favorite or traditional fishing sites to catch and dry enough salmon to use for the year ahead.

The tribes strive to keep at least some subsistence fisheries open the entire year and regard subsistence fishing as an extremely important way for tribal people to provide food for themselves. Even during commercial fisheries, a certain portion of the catch is normally retained for subsistence use. At times not all tribal members are able to participate in fisheries, those who fish typically share fish with family and friends. Sharing and informal distribution of fish help to bind the community in a system of relationships and obligations. Tribal subsistence harvest can also be used for trade or barter among tribes.

The early history of non-Indian use of fishery resources in the Columbia River Basin is described in Craig and Hacker (1940). Due to the importance of recreational fisheries, the USFWS and NMFS jointly issued the “The Policy for Conserving Species Listed or Proposed for Listing Under the Endangered Species Act While Providing and Enhancing Recreational Fisheries Opportunities” on June 3, 1996 (61 FR 27978), which was issued pursuant to the Presidential Executive Order 12962, issued on June 7, 1995. That order requires Federal agencies, to the extent permitted by law, and where practical and in cooperation with States and the tribes, to improve the quality, function, productivity, and distribution of aquatic resources for increased recreational fishing opportunity. Among other actions, the order requires all Federal agencies to aggressively work to promote compatibility and reduce conflict between administration of the ESA and recreational fisheries.

3.5. ENVIRONMENTAL JUSTICE

In 1994, the President issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*. Environmental justice is defined as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." Environmental justice analysis considers whether adverse human health or environment effects of a program would be disproportionately borne by minority and low-income populations, often referred to as the environmental justice communities of concern. Fisheries, such as those that are the subject of this EA, have the potential to affect the extent of fish available for subsistence and economic purposes for minority and low-income populations.

This EIS incorporates the same methodology as Section 3.7.1 of the *U.S. v. Oregon* FEIS for defining low income and minority thresholds for counties. An environmental justice county is one whose minority or low-income population was meaningfully greater than the state in which the county is located.

Thirteen (out of fourteen) counties in the project area qualify as communities of concern; two qualify based on minority population threshold, three qualify based on minority population and low-income thresholds and eight qualify as low-income threshold only. Through treaties, the United States made commitments to protect tribes' rights to take fish. These rights are of enormous cultural and societal importance to the tribes; thus, impacts to commercial, subsistence, and ceremonial harvest opportunities are examined for any effect on tribal and low-income harvest. All tribes identified in the Project Area are considered environmental justice communities of concern and, accordingly, tribal effects are a specific focus of the environmental justice analysis. Although individual tribes may not meet environmental justice analysis criteria for minority or low-income populations, they are regarded as affected groups for environmental justice purposes, as defined by USEPA guidance (EPA 1998). Only one county (Garfield County in Washington) did not meet any criteria to be considered a community of concern (Table 13).

Table 13. Summary of environmental justice communities of concern analysis. Bold text indicates the county meets the criteria for low income community, italicized text indicates it meets the criteria for minority community, and bold italicized text

indicates it meets both criteria.

State, County	Total Population (2017 estimates)	Percent Non-White	Percent Indian	Percent Hispanic	Poverty Rate Percent	Per Capita Income $ (2016)
Idaho						
Statewide Reference Area	1,716,943	18.0	1.7	12.5	14.4	$24,280.00
Adams County	4,147	8.1	1.3	3.8	**14.6**	$22,741.00
Clearwater County	8,546	9.6	*2.3*	4.1	13.1	$21,316.00
Idaho County	16,369	9.1	*3.1*	3.5	**16.1**	$19,524.00
Latah County	39,333	11.1	0.9	4.3	**22.4**	$22,717.00
Lewis County	3,887	15.4	*6.5*	4.4	**15.9**	$22,589.00
Nez Perce County	40,385	13.0	*6.0*	3.6	13.6	$25,179.00
Washington County	10,198	4.1	0.8	*17.2*	**23.0**	$14,710.00
Oregon						
Statewide Reference Area	4,142776	24.2	1.8	12.4	13.3	$28,822.00
Union County	26,222	11.3	1.3	4.8	**18.6**	$25,458.00
Wallowa County	7,051	6.9	0.9	3.0	**14.6**	$24,956.00
Washington						
Statewide Reference Area	7,405,743	31.3	1.9	12.7	11.3	$32,999.00
Asotin County	22,535	9.5	1.8	4.0	**14.5**	$25,760.00
Columbia County	4,047	14.9	1.7	8.3	**14.8**	$26,536.00
Franklin County	91,125	*59.7*	1.7	*53.3*	**16.4**	$20,997.00
Garfield County	2,210	10.2	0.6	5.7	11.3	$23,313.00
Whitman County	49,046	21.3	0.8	6.4	**30.0**	$20,957.00

Source: U.S. Census Bureau (2017), 2012-2016 American Community Survey, Table B17001: Poverty Status in the Past 12 Months by Sex and Age; Table B19301: Per Capita Income in the Past 12 Months (in 2016 Inflation Adjusted Dollars).

The following Indian tribes are located within the project area and/or may rely on fall Chinook and Coho salmon fisheries in the Snake River Basin for cultural and subsistence purposes:

- Nez Perce Tribe
- Confederated Tribes of the Umatilla Indian Reservation
- Shoshone-Bannock Tribes

Present day tribal reservations may encompass a fraction of a tribe's previously occupied territory; therefore, two of tribes (the Nez Perce and the Umatilla) have the exclusive right of taking fish on their reservations as well as the right to take fish at all usual and accustomed places in accordance with applicable treaties. For example, the combined amount of tribal reservation land for the NPT reservation consists of 770,000 acres, but the tribes' aboriginal lands and ceded areas encompass 13 million acres (CRITFC 1994).

3.5.1. Nez Perce Tribe

The NPT has lived in and held historical and cultural ties to the greater Columbia River Basin, with the Nez Perce Tribe Reservation being located in north-central Idaho (Figure 2). The Tribe has many fishing locations spread throughout most of the Columbia and Snake River basins[8].

Under the guidance of the 1855 Treaty, the NPT co-manages fisheries resources throughout the project area through the Tribe's Department of Fisheries Resources Management Program. The Tribe works and coordinates with state, Federal, and Tribal entities while monitoring fish resources within the region. Tribal members also fish on the Clearwater River, which runs through the Nez Perce Indian Reservation, on other rivers and tributaries in the Clearwater River Subbasin, on the Salmon River Subbasin, tributaries to the Snake River in Southeast Washington and Northeast Oregon, and on the Columbia River outside of the project area. Presently, NPT steelhead, fall Chinook, and Coho salmon fisheries are limited in scope.

The NPT subsistence cycle consists of specific times of the year for fishing for salmon, digging camas and other roots, hunting game, etc. This economic cycle can generally be summarized as ten months salmon fishing and two months berry picking, with hunting most of the year (Figure 8). Salmon fishing was one of the major sources of subsistence because the Snake River and its tributaries had abundant runs in aboriginal times. It is estimated that each Nez Perce Tribe member historically consumed an average of 623 grams of fish per day (salmon, steelhead, trout, etc). The current estimate is an average consumption per tribal member of 79 grams of fish per day (EPA 2016). It is notable that salmon and steelhead runs declined significantly (over 90%), and this affects the number of fish that can be harvested and consumed by tribal members.

[8] Overview of the Nez Perce Tribe. Accessed February, 2019

Figure 9. Nez Perce Tribe Subsistence Cycle (courtesy of the Nez Perce Tribe).

Nez Perce Tribal members can fish at "usual and accustomed" fishing places throughout much of the Columbia River Basin, but it should be acknowledged that many tribal families have traditional areas that they have fished for generations. This cultural attachment to certain fishing locations makes it particularly difficult for tribal members to change where they fish and how they fish.

3.5.2. Confederated Tribes of Umatilla Indian Reservation

The CTUIR includes the Umatilla, Walla Walla, and Cayuse tribes[9]. These tribes have long depended on the abundant fisheries in the Columbia Plateau, historically living around the confluence of the Yakima, Snake, and Walla Walla Rivers. The Cayuse lived "…south of and between the Nez Perces and Wallah-Wallahs, extending from the Des Chutes or Wawanui river

[9] Overview of the Confederated Tribes of the Umatilla Indian Reservation. Accessed February, 2019

to the eastern side of the Blue Mountains. It [their country] is almost entirely in Oregon, a small part only, upon the upper Wallah-Wallah River, lying within Washington Territory." [10] The Umatilla tribes traveled over vast areas to take advantage of salmon and steelhead runs, traditionally fishing the Columbia and Snake Rivers, and the Imnaha, Tucannon, Walla Walla, Grande Ronde, Umatilla, John Day, Burnt, and Powder Rivers of northeastern Oregon and southeastern Washington (USBOR 1988).

Tribal members typically harvest spring, summer, and fall Chinook salmon and steelhead in the Columbia River and its tributaries located in southeastern Washington and northeastern Oregon. The CTUIR has co-management responsibilities of fishery activities within the Columbia, Snake, Walla Walla, Tucannon, and Grande Ronde Rivers.

3.5.3. Shoshone-Bannock Tribes

The Shoshone-Bannock Tribes (SBT) consist of the Northern Shoshone and the Bannock Bands. In 1868, the Shoshone and Bannock Tribes were granted 1.8 million acres in southeastern Idaho under the Fort Bridger Treaty, establishing the Fort Hall Indian Reservation. Today, this reservation is home to the SBT in Idaho between the cities of Pocatello, American Falls, and Blackfoot, and it is comprised of land in Bingham, Power, Bannock, and Caribou counties (Figure 1).

The SBT asserts that, under Article IV of the 1868 Treaty, members of the SBT harvest subsistence foods from unoccupied lands of the United States, including fall Chinook and coho salmon. For the purposes of this evaluation, NMFS assumes that members of the SBT will primarily harvest fish in the Salmon and Snake River basins within the project area. Based on internal SBT evaluations, these harvest levels have remained minimal or near ceremonial levels throughout the project area for the past decade.

4. Environmental Consequences

This chapter describes the analysis of the direct and indirect environmental effects associated with the alternatives on the affected resources. The effects of each of the alternatives are described relative to the no-action alternative (e.g., Alternative 1), with the exception of Alternative 1, which is compared to baseline conditions. The relative magnitude of impacts is described using the following terms:

- Undetectable – The impact would not be detectable
- Negligible – The impact would be at the lower levels of detection
- Low – The impact would be slight, but detectable
- Moderate – The impact would be readily apparent

[10] History of CTUIR Accessed February, 2019.

- High – The impact would be severe

In addition to impact severity, some impacts could be further defined as either beneficial (i.e., positive) or adverse (i.e., negative) to the resource. The exception is for negligible impacts, which are below detection levels, and thus cannot be determined to be beneficial or adverse. The baseline conditions for five resources (wildlife, fish, vegetation, socioeconomics, and environmental justice) are described in Chapter 3, Affected Environment. This chapter provides an analysis of the direct and indirect environmental effects associated with the four alternatives on these five resources and builds and expands on the impacts described in the *U.S. v. Oregon* FEIS. Cumulative effects are analyzed in Chapter 5, Cumulative Effects.

4.1. WILDLIFE

Fisheries remove potential prey for wildlife and potential carcasses from the watershed. Fisheries can also result in impacts to wildlife habitat through disturbance from the presence of boats, people, and noise. These activities can cause animals to temporarily depart fishing areas where boating or fishing activity occurs. Generally, the impact is short in duration and does not result in loss or injury to non-targeted animals, but when fishing activity is a sustained, significant effort and localized to a specific area, the effects from human presence could result in increased stress and energy expenditure to marine and freshwater wildlife while these animals pursue other places to forage and seek cover. These effects are limited to animals in or around fishing areas.

The overall effects of the alternatives on wildlife are summarized in Table 14 and described in greater detail in Section 4.1.1 through Section 4.1.4.

Table 14. Summary of effects of the alternatives on wildlife relative to current conditions for Alternative 1 and to the "no action" alternative for Alternatives 2 through 4.

Resource	Alternative 1: No action	Alternative 2: Proposed action	Alternative 3: Additional conservation measure	Alternative 4: Close proposed fisheries
Wildlife	Negligible	Negligible	Negligible	Negligible

4.1.1. Alternative 1 (No Action)

Under Alternative 1, NMFS would not make determinations under the 4(d) Rule or Tribal 4(d) Rule and NMFS will assume that the states and tribes would continue to implement their fisheries as under current conditions. Therefore, there would be a continuation of baseline effects on wildlife as described in Section 3.1, Wildlife into the future. In summary, the fisheries would continue to remove adult fall Chinook salmon, coho salmon and resident trout which would reduce the number of fish available to wildlife that prey or scavenge on these fish species, such as river otters and eagles. Under Alternative 1, there would continue to be some disturbance to wildlife through the presence of boats and people, which may result in wildlife temporarily departing the fishing area.

Any anadromous fish taken through fisheries inside the Snake River under Alternative 1 would already not be available to SRKW or pinnipeds given that the fish would have already passed through their respective ocean habitat, prior to having been subject to the proposed fisheries. In addition, the capacity limit of the current spawning habitat does not always allow for increased juvenile production at higher escapement numbers and proposed fisheries are managed to meet broodstock goals for current hatchery production. Overall, Alternative 1 would be similar to current conditions, and would result in negligible impacts to wildlife relative to those conditions.

4.1.2. Alternative 2 (Proposed Action)

Under Alternative 2, harvest of fall Chinook salmon, coho salmon and resident trout would occur as described in the FMEPs and TRMP and under the specified ESA limits for Snake River fall Chinook salmon (Table 2). As a result, there would be an increase in take of fall Chinook under Alternative 2 because adipose-intact fish (which includes 40 percent natural-origin fish) would also be targeted and because fisheries would be managed under higher impact rate limits for fall Chinook salmon under this alternative compared to Alternative 1. There would also be an increase in take of coho salmon under Alternative 2 compared to Alternative 1 because existing fisheries could be expanded, and new fisheries implemented under this alternative. An increase in harvest of Chinook and coho salmon under Alternative 2 relative to Alternative 1 would reduce the number of fish available to wildlife that prey or scavenge on salmon, such as river otters, and eagles. In addition, there could be more disturbances under Alternative 2 from boats and people relative to Alternative 1.

Any anadromous fish taken through fisheries inside the Snake River under Alternative 2 would already not be available to SRKW or pinnipeds given that the fish would have already passed through their respective ocean habitat, prior to having been subject to the proposed fisheries. Additionally, the capacity limit of the current spawning habitat does not always allow for increased juvenile production at higher escapement numbers and proposed fisheries are managed to meet broodstock goals for current hatchery production. Therefore, Alternative 2 would have negligible effects on marine mammals compared to Alternative 1.

4.1.3. Alternative 3 (Additional Conservation Measure)

Under Alternative 3, the additional conservation measure for fall Chinook salmon fisheries would be implemented. However, because the harvest rate in Table 2 would be used to manage fall Chinook salmon fisheries under Alternative 3, this alternative would result in the removal of potentially the same number of Chinook salmon from the ecosystem compared to Alternative 2.

However, Alternative 3 would result less removal of adipose-intact Chinook salmon in the area upstream of the Salmon River confluence with the Snake River to Hells Canyon Dam (RM 188.2 to 247.0 on the Snake River). As a result, under Alternative 3, less fish would be available to wildlife that prey or scavenge on salmon, such as otter and eagles compared to Alternative 1. In addition, there would be more disturbances from boats and people fishing under Alternative 3 relative to Alternative 1.

Any anadromous fish taken through fisheries inside the Snake River under Alternative 3 would already not be available to SRKW and other marine mammals given that the fish would have already passed through their respective ocean habitat, prior to having been subject to fisheries. Additionally, the capacity limit of the current spawning habitat does not always allow for increased juvenile production at higher escapement numbers and proposed fisheries are managed to meet broodstock goals for current hatchery production. Therefore Alternative 3 would have negligible effects compared to Alternative 1.

4.1.4. Alternative 4 (Close all Proposed Fisheries)

Under Alternative 4, proposed fisheries would close, which would result in the removal of fewer salmon from the ecosystem compared to Alternative 1. As a result, more fish would be available to wildlife that prey or scavenge on salmon, such as otter, mink, and eagles. In addition, there would be fewer disturbances from boats and people fishing. Any anadromous fish taken through fisheries inside the Snake River under Alternative 3 would already not be available to SRKW and other marine mammals given that the fish would have already passed through their respective ocean habitat, prior to having been subject to fisheries. Additionally, the capacity limit of the current spawning habitat does not always allow for increased juvenile production at higher escapement numbers and proposed fisheries are managed to meet broodstock goals for current hatchery production. Therefore Alternative 4 would have negligible effects compared to Alternative 1.

4.2. FISH

Fisheries can reduce fish abundance and spawning potential. Reducing fish abundance, and subsequent spawning population potential, can lead to impacts on population parameters such as abundance and productivity. In addition, by targeting and reducing the abundance of certain species, fisheries can modify the trophic chain and the flows of biomass (and energy) across the ecosystem as well as remove the nutrients from the system that are contained within the fish carcasses themselves.

The overall effects of the alternatives by fish species are summarized in Table 15 and described in greater detail in Section 4.2.1 through Section 4.2.4. Because none of the alternatives would result in construction or other activities that would affect PBFs as described in Section 3.2, none of the alternatives would be expected to have more than minimal effects on critical habitat. The direct effects through interception of adult fish as they are migrating and indirect effects on substrate, riparian vegetation, and juvenile migration are expected to be small in magnitude and transitory in time frame.

Table 15. Summary of effects of the alternatives on fish species relative to current conditions for Alternative 1 and to the “no action” alternative for Alternatives 2 through 4.

Resource	Alternative 1: No Action	Alternative 2: Proposed action	Alternative 3: Additional conservation measure	Alternative 4: Close proposed fisheries
Snake River spring/summer Chinook salmon	Negligible	Negligible	Negligible	Negligible
Snake River fall Chinook salmon	Low adverse	Moderate adverse	Moderate adverse	Low adverse
Snake River steelhead	Low adverse	Low adverse	Low adverse	Low adverse
Snake River sockeye salmon	Negligible	Negligible	Negligible	Negligible
Bull trout	Low adverse	Low adverse	Low adverse	Low beneficial
Coho salmon	Low adverse	Low adverse	Low adverse	Low beneficial
Other fish species	Negligible	Negligible	Negligible	Negligible

4.2.1. Alternative 1 (No Action)

Under Alternative 1, NMFS would not make determinations under the 4(d) Rule or Tribal 4(d) Rule and the states and tribes would not manage their proposed fisheries under overarching management frameworks that would limit the combined impacts of ESA-listed species. It is difficult to predict the total level of fishing that would occur under this alternative, but NMFS assumes that fisheries would be managed as under current conditions. Therefore, NMFS assumes that the states and tribes would continue to implement their fall Chinook and coho salmon fisheries, as well as resident trout and other ongoing fisheries as under current conditions. The effects of Alternative 1 on fish species are summarized in the sections below. For all fish species, the contribution of salmon carcasses to the total amount of marine-derived nutrients in the Snake River Basin would be the same as under baseline conditions.

Snake River Spring/Summer Chinook Salmon ESU

Snake River spring/summer Chinook salmon enter the Snake River earlier than fall Chinook and coho salmon and are not often intercepted (< 10 encountered annually; NMFS 2019a) in ongoing fisheries targeting these species. Ongoing salmon and resident trout fisheries in the Snake River have not reported impacts and would have a negligible impact on the long-term abundance, productivity, spatial structure and diversity of the Snake River spring/summer Chinook salmon ESU because fisheries would not change relative to current conditions.

Snake River Fall Chinook Salmon ESU

Fall salmon fishing overlaps with steelhead fisheries, and it is difficult to parse out impacts from the fisheries to be able to attribute them only to fall salmon fisheries. Based on the available data, the average mortality of natural-origin Snake River Fall Chinook salmon under currently ongoing fisheries is 3.0% of the natural-origin fall Chinook salmon that cross Lower Granite Dam each year, with about an 11% capture rate. The harvest of hatchery-origin fall Chinook salmon from state recreational and tribal fisheries has averaged about 1,083 fish, or about 4% of the run that passes over Lower Granite Dam (Table 7). Capture rates are slightly higher at 9% because of encounters with unmarked hatchery-origin fish, which under current state regulations must be released.

Resident trout fisheries included in the proposed action primarily take place in Oregon tributaries of the Snake River basin, which have little to no overlap with the fall Chinook salmon spawning aggregations. Therefore, interactions with adult fall Chinook salmon are likely to be no more than a few adults, if any. Because very little to no fall Chinook salmon spawning occurs in Oregon tributaries, interactions with juvenile fall Chinook salmon are also likely to be minimal.

Although the ongoing fisheries under Alternative 1 would continue to have a low adverse impact compared to current conditions on the ESU's abundance, ongoing fisheries under Alternative 1 could impact productivity because recent work has found that the single listed population has a total spawning capacity of between 10,000 to 20,000 spawners, and the recent returns over Lower Granite Dam have exceeded this value. Diversity or spatial structure of the Snake River Fall Chinook Salmon ESU are unlikely to be greatly affected because harvest is not limited to certain geographic areas, and occurs over the course of the entire return.

Snake River Steelhead DPS

Fall Chinook salmon and coho fishing overlaps with steelhead fisheries, and it is difficult to parse out impacts from the two fisheries, especially because it is likely that most recreational fishermen are targeting steelhead, and not fall Chinook salmon. Thus, steelhead are unlikely to be considered incidental take in fall salmon fisheries. The resident trout fishery could overlap with steelhead in some areas and it is likely that a small number of adults (< 10), and a larger number of steelhead juveniles could be encountered in this fishery. Thus, under Alternative 1, incidental lethal take of Snake River steelhead resulting from the implementation of ongoing salmon fisheries in the Snake River would have a low adverse impact on the abundance of this DPS. However, impacts to steelhead from all the proposed fisheries would be limited by the newly approved harvest framework, which sets limits for each listed major population group to either 5% or 10% of the number of natural-origin steelhead that pass over Lower Granite

Dam.(NMFS 2019c).

Snake River Sockeye Salmon ESU

Ongoing fall Chinook and coho salmon fisheries may result in a small amount of incidental take of Snake River sockeye salmon (< 10 encounters annually; NMFS 2019a). This is because the fall salmon fisheries take place after the majority of sockeye salmon have migrated up to their natal spawning areas in the Stanley Basin within the Salmon River (IDFG 2019b). Ongoing fisheries in the Snake River have not reported impacts and would have a negligible impact on the long-term abundance, productivity, spatial structure and diversity of the Snake River sockeye salmon ESU because fisheries would not change relative to current conditions.

Bull Trout

Under the current conditions and Alternative 1, the USFWS estimates that approximately 4,000 bull trout annually would be incidentally captured during the proposed fisheries and be disturbed through handling and release, and up to 200 bull trout annually would suffer mortality (USFWS 2019). This represents less than 1 percent of the estimated 34,327 adult bull trout in project area (USFWS 2019). Therefore, similar to current conditions, Alternative 1 would have a low adverse impact on bull trout.

Coho Salmon

Ongoing fall Chinook and coho salmon fisheries under Alternative 1 would result in the capture and mortality of coho salmon. However, it is difficult to distinguish between the effects of these fisheries because they overlap in both time and space. However, less than 200 coho per year have been harvested in recent years in the Snake River Basin, with likely similar numbers captured due to the non-selectivity of coho fisheries. Resident trout fisheries are unlikely to currently capture many coho salmon, but this could increase in the future as coho start to return to the Grande Ronde Basin from the first ever releases of coho salmon in that area in 2014. Therefore, a low adverse effect would be expected under Alternative 1 because fisheries would be similar to those occurring in recent years.

Other Fish Species

As described in Section 3.2, Fish, a few other fish species may be incidentally taken in ongoing fisheries under baseline conditions. The effects on these species from Alternative 1 would be negligible because none of the fisheries would target these species and incidental encounter of non-target species is likely low because of the specificity of salmon and trout gear. Other native fish that may be incidentally encountered in ongoing fisheries may interact with salmon and resident trout ecologically through predator or prey relationships. Therefore, some other fish that act as prey could benefit from the proposed action, while predators could be negatively affected. Also, salmon are not actively feeding when they return to spawn, so whether they are removed from the system through harvest is not likely to have any impact on other fish species. Therefore, the impact on the species under Alternative 1 would be negligible because only a very small percentage of the total abundance of these species would be impacted.

4.2.2. Alternative 2 (Proposed Action)

Under Alternative 2, fishery managers in the Snake River Basin would manage fall Chinook salmon fisheries under an overarching framework that limits combined impacts on natural-origin Snake River fall Chinook ESU (Table 2). Under the framework, total allowable impacts would be higher than total estimated impacts in recent years and would allow fisheries directed at adipose-intact fall Chinook salmon. Also, under Alternative 2, fishery managers in the Snake River Basin would conduct coho salmon and resident trout fisheries under shared management frameworks, and impacts on natural-origin fall Chinook salmon in these fisheries would count towards the ESA limits in Table 2.

The effects of Alternative 2 on fish species are summarized in the sections below. For all fish species, the contribution of salmon carcasses to the total amount of marine-derived nutrients in the Snake River Basin would be slightly lower than Alternative 1.

Snake River Spring/Summer Chinook Salmon ESU

Adult Snake River spring/summer Chinook salmon enter the Snake River earlier than fall chinook and coho salmon and are not often intercepted in ongoing Snake River fall chinook and coho salmon fisheries. Less than 10 Snake River spring/summer Chinook salmon would be expected to be encountered under Alternative 2 due to the temporal differences in run timing. Therefore, like Alternative 1, Alternative 2 would be expected to have a negligible impact on the long-term abundance, productivity, spatial structure and diversity of the Snake River spring/summer Chinook salmon ESU because the proposed fisheries are not expected to result in incidental take of this ESU.

Snake River Fall Chinook Salmon ESU

The fall Chinook fisheries under Alternative 2 may increase mortality of natural-origin fall Chinook salmon from 6 to 19% if we applied the harvest schedule to data from years 2010-2017 (IDFG 2019b) compared to a mortality rate of about 3% under Alternative 1 (because adipose-intact fish may be kept). Proposed fisheries under Alternative 2 would not be expected to impact the diversity, or spatial structure of the Snake River fall Chinook salmon ESU for the same reasons stated above for Alternative 1. However, the harvest schedule in Alternative 2 is intended to decrease impacts on natural-origin adult fall Chinook salmon as natural-origin abundance decreases, potentially becoming more restrictive than Alternative 1 at low abundance levels, especially those below CAT. In addition, it considers a "buffered" MAT" value (NMFS 2017a)[11], when determining harvest impacts and there are likely to be some adipose-intact

[11] When considering one two population in this ESU, the recovery plan uses 3,000 as MAT. But when considering only one population under recovery scenario C, the recovery plan calls for a "buffered MAT" value of 4,200 fish.

hatchery-origin fish that escape the fisheries to spawn naturally and bolster abundance. Also Perry et al. (2017) claim that negative effects on productivity could result when abundances are between 10,000 and 20,000 total spawners. Thus, fisheries could benefit productivity when adult returns are high by limiting the number of natural spawners.

This alternative may also increase impacts to fall Chinook salmon redds, if the number or distribution of anglers increases compared to Alternative 1. If a substantial amount of redds are trampled or disturbed, this could potentially reduce the productivity of the population.

We expect the effects from coho and resident trout fisheries to be similar to those under Alternative 1. Thus Alternative 2 is expected to have a moderate adverse effect on this ESU because it does allow for increased harvest of natural-origin fall Chinook salmon.

Snake River Steelhead DPS

Under Alternative 2, fishery-related mortalities of natural-origin Snake River steelhead relative to Alternative 1 would be expected to have a low adverse impact on the abundance of the Snake River Steelhead DPS. In addition, all incidental lethal impacts on steelhead from the proposed fisheries under Alternative 2 would count towards the overall limit on total harvest of Snake River steelhead under current conditions and similar to Alternative 1. Therefore, Alternative 2 would provide low adverse effects on Snake River steelhead abundance.

Snake River Sockeye Salmon ESU

The ongoing portions of the proposed fisheries have not reported incidental take of any Snake River sockeye salmon because the timing and the locations of the fisheries are different than when and where sockeye are present in the river (IDFG 2019b). This same level of impact would be expected to continue under Alternative 2 because the proposed fisheries would be implemented in the same time and places as under current conditions. Therefore, similar to Alternative 1, Alternative 2 would have a negligible impact on the long-term abundance, productivity, spatial structure, and diversity of the Snake River sockeye salmon ESU.

Bull Trout

As noted in section 3.2.5, about 9 percent bull trout would be handled and less than 0.04 percent bull trout would be killed incidentally annually during the Proposed fisheries, Alternative 2 would have a low adverse effect on bull trout. This would be a similar, but slightly higher, level of impact as under Alternative 1 because fishing pressure on fall Chinook salmon would be greater under Alternative 2 than under Alternative 1.

Coho Salmon

A higher level of impact would be expected under Alternative 2 because fishing pressure on fall Chinook salmon and coho salmon would increase due to authorization of those fisheries, and the addition of Oregon coho fisheries. However, this effect would not rise to a moderate adverse effect because hatchery broodstock needs are factored into fishery targets ensuring that hatchery production remains consistent. Therefore, compared to Alternative 1, Alternative 2 would have a low adverse effect on coho salmon in the project area.

Other Fish Species

As described in Section 3.2, Fish, a few other fish species are incidentally taken in ongoing fisheries. The impact on the species under Alternative 2 would continue to be negligible because, even if fishing pressure on fall Chinook salmon increases relative to Alternative 1, the specificity of salmon and trout gear is likely to continue to limit incidental encounters of other fish. In addition, similar predator and prey interactions would take place. Therefore, similar to Alternative 1, the effects on other fish species under Alternative 2 would be negligible.

4.2.3. Alternative 3 (Additional Conservation Measure)

Under Alternative 3, an additional conservation measure would be implemented, which would result in a reduction in yearly incidental impacts on natural-origin fall Chinook salmon in the area upstream of the Salmon River confluence with the Snake River to Hells Canyon Dam (RM 188.2 to 247.0 on the Snake River). However, the total ESA limit under Alternative 3 would be the same as under Alternative 2, and thus the total take of natural-origin fall Chinook salmon under Alternative 3 would be the same as under Alternative 2. The effects of Alternative 3 on fish species are summarized in the sections below. The contribution of salmon carcasses to the total amount of marine-derived nutrients in the Snake River Basin would be the same as under Alternative 2 because the same number of Chinook salmon would be removed in the fisheries under both alternatives.

Snake River Spring/Summer Chinook Salmon ESU

Adult Snake River spring/summer Chinook salmon enter the Snake River earlier than fall Chinook and coho salmon and are not often intercepted (likely less than 10) in ongoing Snake River fall chinook and coho salmon fisheries. Therefore, similar to Alternative 1, Alternative 3 would have a negligible effect on the long-term abundance, productivity, spatial structure, and diversity of Snake River spring/summer Chinook ESU because this alternative is not expected to result in incidental take of this ESU.

Snake River Fall Chinook Salmon ESU

Under Alternative 3, the proposed fisheries would be expected to have higher effects on Snake River fall Chinook salmon compared to Alternative 1 because retention of adipose-intact fall Chinook salmon fishery would be allowed in most areas, except in the area upstream of the Salmon River confluence with the Snake River to Hells Canyon Dam (RM 188.2 to 247.0 on the Snake River). Under Alternative 3, the proposed fisheries may benefit the spatial structure of Snake River fall Chinook salmon because of the added conservation measure that is meant to support the cultivation of a natural production emphasis area. However, the potential for increased angler activity in the Clearwater River could negatively impact the productivity of the population by disturbing/trampling of redds. Therefore, relative to Alternative 1, Alternative 3 would have a slightly higher ~~the same~~ moderate adverse impact on the long-term abundance, productivity, spatial structure and diversity of the Snake River fall Chinook salmon ESU.

Snake River Steelhead DPS

Under Alternative 3, impacts on natural-origin Snake River steelhead would be the same as under Alternative 1 because the additional conservation measure for fall Chinook salmon is unlikely to influence steelhead fishing occurring simultaneously. Therefore, relative to Alternative 1, Alternative 3 would have the same low adverse impact on the long-term abundance, productivity, spatial structure and diversity of the Snake River steelhead DPS.

Snake River Sockeye Salmon ESU

The same level of impacts would be expected to continue under Alternative 3 because the additional conservation measure would not affect this ESU. Therefore, relative to Alternative 1, Alternative 3 would have a negligible impact on the long-term abundance, productivity, spatial structure and diversity of the Snake River sockeye salmon ESU.

Bull Trout

Under Alternative 3, there would be an increase in fishing pressure for fall Chinook salmon relative to Alternative 1. Alternative 3 would be expected to result in a slight increase in the incidental capture of bull trout relative to Alternative 1 without a discernable chance on impact level. Therefore, Alternative 3 would be expected to have a low adverse effect on bull trout relative to Alternative 1.

Coho Salmon

Under Alternative 3, the implementation of the additional conservation measure for fall Chinook salmon would not alter fisheries that target coho salmon. Therefore, Alternative 3 would have a low adverse effect on coho salmon that is slightly higher than Alternative 1, but not enough to make a difference.

Other Fish Species

As described in Section 3.2, Fish, a few other fish species are incidentally taken in ongoing fisheries. The impact on the species under Alternative 3 would continue to be negligible because, even if fishing pressure on fall Chinook salmon increases relative to Alternative 1, the specificity of the fishing gear is likely to limit impacts, and ecological interactions are likely to be similar.

4.2.4. Alternative 4 (Close Proposed Fisheries)

Under Alternative 4, fisheries for fall Chinook and coho salmon in the Snake River would be closed, along with resident trout fisheries in Oregon. The following sections summarize the anticipated effect of Alternative 4 on fish species. For all fish species, the contribution of salmon carcasses to the total amount of marine-derived nutrients in the Snake River Basin would be greater under Alternative 4 than under Alternative 1 because salmon would not be targeted in the Snake River Basin fisheries.

Snake River Spring/Summer Chinook Salmon ESU

Snake River spring/summer Chinook salmon enter the Snake River earlier than fall Chinook or coho salmon and are not often intercepted in Snake River fall Chinook or coho salmon fisheries. Because the expected encounters of fish from of this ESU under Alternative 1 is less than 10, closing the proposed fisheries under Alternative 4 would be expected to have a negligible impact on the long-term abundance, productivity, spatial structure and diversity of the Snake River spring/summer Chinook salmon ESU.

Snake River Fall Chinook Salmon ESU

Under Alternative 4, the impacts of the proposed fisheries on Snake River fall Chinook would be eliminated. However, the incidental take of Snake River fall Chinook in other ongoing fisheries would still occur and is estimated at about 6% of the run (NMFS 2019c). In addition, the closure of ongoing fisheries would allow hatchery-origin fall Chinook to spawn freely, which could represent a genetic risk to the population through interbreeding, and an ecological risk due to an exceedance of the potential habitat capacity of 10,000 to 20,000 spawners. Therefore, compared to Alternative 1, Alternative 4 would have a low adverse effect on the Snake River Fall Chinook Salmon ESU, but for different reasons than the low adverse effect assigned to Alternative 1.

Snake River Steelhead DPS

Under Alternative 4, impacts on natural-origin steelhead from the Snake River steelhead fisheries would continue as under baseline conditions because ESA limits for this DPS are regulated by a separate ongoing process. Therefore, Alternative 4 would be expected to have a low adverse effect on the Snake River steelhead DPS, similar to Alternative 1.

Snake River Sockeye Salmon ESU

The proposed ODFW, WDFW and NPT salmon fisheries in the Snake River are expected to have a similar near-zero impact. Under Alternative 4, closing all proposed fisheries would have the same negligible impact on the long-term abundance, productivity, spatial structure and diversity of the Snake River sockeye salmon ESU, relative to Alternative 1.

Bull Trout

Because proposed fisheries would be closed under Alternative 4, the 21% of bull trout handled and less than 2% bull trout mortality estimated annually would decrease, although the majority of these impacts are likely not attributed to the short fall salmon fishing season. Therefore, relative to Alternative 1, Alternative 4 would have a low beneficial effect on bull trout.

Coho Salmon

In 2017, less than 200 coho salmon were caught by Idaho anglers in both the steelhead and coho salmon fisheries (Don Whitney, IDFG, personal communication, December 2018). Under Alternative 4, the proposed fisheries would be closed, and fewer coho would be intercepted than under baseline conditions as incidental take of coho in ongoing steelhead fisheries is low (likely less than 50). Therefore, Alternative 4 would have a low beneficial effect on coho salmon, and more coho salmon would spawn naturally than under Alternative 1.

Other Fish Species

The impact on other fish species under Alternative 4 would be negligible because the proposed fisheries would not encounter other fish incidentally. In addition, some other native fish not encountered under Alternative 4 may interact with salmon and steelhead ecologically through predator or prey relationships that are potentially offsetting in their effects

4.3. VEGETATION

The overall effects of the alternatives on vegetation are summarized in Table 16 and described in greater detail in Section 4.3.1 through Section 4.3.5.

Table 16. Summary of effects on general vegetation relative to current conditions for Alternative 1 and to the "no action" alternative for alternatives 2 through 4.

Resource	Alternative 1: No action	Alternative 2: Proposed action	Alternative 3: Additional conservation measure	Alternative 4: Close proposed fisheries
Vegetation	Negligible	Negligible	Negligible	Negligible

4.3.1. Alternative 1 (No Action)

Under Alternative 1, there would be a continuation of baseline effects on vegetation as described in Section 3.3, Vegetation, because harvest would continue into the future at existing levels. Alternative 1 could increase negative effects on vegetation if new access points are created and anglers trample vegetation, but these effects would be expected to be negligible because anglers typically access the riverbanks though well-established access points. There are no ESA-listed plants species along the riverbanks in the project area so there would be little to no likelihood that ESA-listed plants would be trampled under Alternative 1.

4.3.2. Alternative 2 (Proposed Action)

Under Alternative 2, fishing pressure for fall Chinook and coho salmon would increase relative to Alternative 1. This increase could adversely affect vegetation if new access points are created and fishermen trample vegetation. However, even if fisheries increase, recreational anglers and tribal fishermen would be expected to continue to access the riverbank though well-established access points, so there would likely be no difference in impacts to vegetation under Alternative 2 relative to Alternative 1. There are no ESA-listed plants species along the riverbanks in the project area so there would be little to no likelihood that ESA-listed plants would be trampled under Alternative 2.

4.3.3. Alternative 3 (Additional Conservation Measure)

Under Alternative 3, an additional conservation measure would be implemented, and recreational adipose-intact fall Chinook salmon fisheries under this alternative would be prohibited in the area upstream of the Salmon River confluence with the Snake River to Hells Canyon Dam (RM 188.2 to 247.0 on the Snake River). Relative to Alternative 1, there would be more anglers or effort, which may result in more trampling of riparian vegetation as anglers access the riverbank. However, because most anglers access the riverbank through well-established access points, the effects would likely be negligible. In addition, other fisheries would continue to take place under Alternative 3, so anglers would continue to affect vegetation as they accessed the riverbank. Therefore, the effects of Alternative 3 would be negligible on vegetation compared to Alternative 1. There are no ESA-listed plants species along the riverbanks in the project area so there would be little to no likelihood that ESA-listed plants would be trampled under Alternative 3.

4.3.4. Alternative 4 (Close Proposed Fisheries)

Under Alternative 4, proposed fisheries would close. Therefore, relative to Alternative 1, there would be fewer anglers in the project area, which may result in less trampling of riparian vegetation as anglers access the riverbank. However, because most anglers access the riverbank through well-established access points, the effects would likely be similar to Alternative 1; negligible. There are no ESA-listed plants species along the riverbanks in the project area so there would be little to no likelihood that ESA-listed plants would be trampled under Alternative 4.

4.4. SOCIOECONOMICS

The overall effects of the alternatives on socioeconomics are summarized in Table 17 and described in greater detail in Section 4.4.1 through Section 4.4.5.

Table 17. Summary of effects of the alternatives on socioeconomics relative to current conditions for Alternative 1 and to the "no action" alternative for alternatives 2 through 4.

Resource	Alternative 1: No action	Alternative 2: Proposed action	Alternative 3: Additional conservation measure	Alternative 4: Close proposed fisheries
Non-Tribal Socioeconomics	Low beneficial	Moderate beneficial	Low adverse	Low adverse
Tribal Socioeconomics	Low beneficial	Moderate beneficial	Moderate beneficial	Moderate adverse

4.4.1. Alternative 1 (No Action)

The effects of Alternative 1 on non-tribal socioeconomics would be low beneficial because ongoing recreational fishing in the Snake River Basin would continue as under baseline conditions and continue to generate revenue though the purchase of fishing-related goods and supplies, retention of local guiding services, and purchase of food and lodging (Section 3.6, Socioeconomics). Recreational fishing for all species across the 3 states in the project area is about 800 million in Idaho, 360 million in Washington, and about 150 million US dollars in Oregon. The proposed fisheries are likely to only represent a fraction of these dollar amounts.

Under Alternative 1, tribal fishing in the Snake River Basin would continue as under baseline conditions, which would allow the tribes to engage in practices that are culturally, spiritually, economically, and symbolically important to the tribes (Section 3.4, Socioeconomics). However, the few salmon (~750 fall Chinook salmon) that would be harvested for all 3,600 Nez Perce Tribal members under Alternative 1 would not be expected to provide a large source of sustenance for the tribes or support tribal identity, health, individual identity, culture, spirituality, religion, emotional well-being, and economy. Therefore Alternative 1 would have low beneficial effects on tribal socioeconomics into the future.

4.4.2. Alternative 2 (Proposed Action)

Under Alternative 2, recreational fisheries targeting fall Chinook salmon would increase, as would coho fisheries in Oregon. Coho salmon fisheries in Idaho and steelhead fisheries would continue as under current conditions. As a result, there would likely be an increase in non-tribal socioeconomic impacts under Alternative 2 relative to Alternative 1. An increase in the amount of revenue would be generated though the purchase of fishing-related goods and supplies, retention of local guiding services, and purchase of food and lodging (Section 3.6, Socioeconomics). Therefore Alternative 2 would have a moderate beneficial effect on non-tribal socioeconomics.

Similarly, there would be increased tribal harvest of fall Chinook and coho salmon under Alternative 2 relative to Alternative 1, which would provide a moderate beneficial effect to the tribes as salmon become more prevalent component of their diet and support tribal identity, health, individual identity, culture, spirituality, religion, emotional well-being, and economy.

4.4.3. Alternative 3 (Additional Conservation Measure)

Under Alternative 3, an additional conservation measure would be implemented, and recreational adipose-intact fall Chinook salmon fisheries would be prohibited in the area upstream of the Salmon River confluence with the Snake River to Hells Canyon Dam (RM 188.2 to 247.0 on the Snake River). Since Alternative 1 would allow for continuance of adipose-clipped fisheries, there would be a similar number of anglers in this specific area compared to Alternative 1.

Tribal fisheries under Alternative 3 are similar to Alternative 2 because the additional conservation measure does not apply to Tribal fisheries. Alternative 3 would provide moderate beneficial effects as it would allow for similar amounts of sustenance and support for tribal identity, health, individual identity, culture, spirituality, religion, emotional well-being, and economy; more than Alternative 1.

4.4.4. Alternative 4 (Close Proposed Fisheries)

Under Alternative 4, the proposed non-tribal fisheries would close. Therefore, relative to Alternative 1, there would be fewer anglers in the project area and less revenue would be generated through the purchase of fishing-related goods and supplies, retention of local guiding services, and purchase of food and lodging (Section 3.6, Socioeconomics). This would be expected to have a low adverse socioeconomic impact on non-tribal communities in the project area compared to Alternative 1.

Under Alternative 4, tribal salmon fisheries would also close. Therefore, compared to Alternative 1, Alternative 4 would have a moderate adverse impact to tribal socioeconomics because the tribes would not have the ability to engage in treaty-reserved salmon fishing and related activities that are culturally, spiritually, economically, and symbolically important to the tribes (Section 3.6, Socioeconomics).

4.5. ENVIRONMENTAL JUSTICE

The overall effects of the alternatives on environmental justice are summarized in Table 18 and described in greater detail in Section 4.5.1 through 4.5.5.

Table 18. Summary of effects of the alternatives on environmental justice relative to current conditions for Alternative 1 and to the "no action" alternative for Alternatives 2

through 4.

Resource	Alternative 1: No action	Alternative 2: Proposed action	Alternative 3: Additional conservation measure	Alternative 4: Close proposed fisheries
Environmental justice	Low beneficial	Moderate beneficial	Moderate beneficial	Moderate adverse

4.5.1. Alternative 1 (No Action)

Under Alternative 1, harvest would continue at existing levels. Therefore, there would be a continuation of baseline effects on environmental justice communities of concern as described in Section 3.5, Environmental Justice. Under Alternative 1, harvest of fall Chinook salmon, coho salmon and resident trout would continue to provide income for these communities of concern and provide fish for ceremonial and subsistence purposes, particularly for Native Americans. Therefore, Alternative 1 would provide a low beneficial effect to environmental justice communities of concern.

4.5.2. Alternative 2 (Proposed Action)

Under Alternative 2, total harvest of fall Chinook salmon would increase relative to Alternative 1 because fall Chinook fisheries would be managed under a new variable abundance-based harvest rate schedule that allow for higher direct and incidental harvest of natural-origin fish. As a result, there would be an increase in harvest of fall Chinook salmon under Alternative 2 when compared to Alternative 1. Also, harvest of coho salmon would increase under Alternative 2 relative to Alternative 1 because coho salmon recreational and tribal fishing may increase compared to Alternative 1. Therefore, Alternative 2 would likely have a moderate beneficial effect on tribes in the Project Area, compared to Alternative 1.

4.5.3. Alternative 3 (Additional Conservation Measure)

Under Alternative 3, an additional conservation measure would be implemented, and recreational adipose-intact fall Chinook salmon fisheries would be prohibited in the area upstream of the Salmon River confluence with the Snake River to Hells Canyon Dam (RM 188.2 to 247.0 on the Snake River). However, fisheries for adipose fin-clipped fall Chinook salmon would be allowed in this section of the Snake River. For the purpose of our analysis, we assume that the additional conservation measure for fall Chinook salmon under Alternative 3 would not alter tribal fisheries or angler participation and that it would increase relative to Alternative 1, which may result in moderate beneficial effects to environmental justice communities of concern that rely on fall Chinook fishing for subsistence, and to generate jobs and income. Coho and resident trout fisheries under Alternative 3 would be the same as under Alternative 1.

4.5.4. Alternative 4 (Close Proposed Fisheries)

Under Alternative 4, fall Chinook salmon, coho salmon, and resident trout fisheries would close, including tribal ceremonial and subsistence, and commercial fisheries. Therefore, relative to Alternative 1, there would be a moderate adverse effect to environmental justice communities of concern that rely on the proposed fisheries to generate jobs and income. It is not clear what effect this reduced expenditure would have on the median income in the communities of concern, but a reduction in activities that use locally-owned or operated businesses would be expected to have an adverse impact on many of the members of these environmental justice communities of concern.

5. CUMULATIVE EFFECTS

Cumulative effects were assessed by combining the effects of each alternative with the effects of other past, present, and reasonably foreseeable future actions that are affecting or will affect the same resources potentially affected by each alternative. Actions are included only if they are tangible and specific, and if effects overlap temporally and geographically with the Proposed Action.

The temporal boundary for this cumulative effects analysis extends from when data on fisheries started to be recorded until the ESA section 4(d) determinations are no longer in effect. Because the *US v Oregon* Management Agreement expires in 2028, it may be possible that changes to downriver conditions could change at that point. The ESA section 4(d) determinations have no expiration date, but would be subject to agency verification if the fisheries' are changed such that plans need to be revised. The fisheries would be periodically reviewed by NMFS and the fishery managers to assess success in meeting purpose and need as described in Section 1.3.

The geographic area for the cumulative effects analysis related to fish and wildlife includes locations where fisheries operate within the Snake River Basin, and also considers the ranges of wildlife that may utilize the target species of these fisheries as prey. The cumulative impacts for socioeconomics and environmental justice were assessed throughout the Snake River Basin.

Finally, the cumulative effects associated with the proposed action were largely addressed by the environmental impact statement for the *US v Oregon* Management Agreement (NMFS 2017c), as well as the recent environmental assessment for the Idaho steelhead fisheries (NMFS 2019b). These reviews looked primarily at the impacts to the human environment from a broader set of fishery or hatchery operations, as described in section 5.2 below. Consequently, this assessment focuses on looking at any changes to those impacts or new information within the project area, particularly (in many cases) the extent to which it modifies the information presented in previous assessments.

5.1. Past, Present, and Reasonably Foreseeable Future Actions

The effects of past and present actions on resources potentially affected by the Proposed Action are recognized as current conditions described in Section 3, Affected Environment. Historical development of the Columbia and Snake River basins for electrical power, flood control, navigation, and agricultural needs has influenced the existing condition of the resources in the study area. This development, along with other factors such as historic harvest, has led to the implementation of management and recovery actions, including numerous hatchery programs. In addition to reasonably foreseeable actions, climate change is discussed in more detail below.

Analyses included in the *U.S. v OR* FEIS, reviewed all impacts associated with hatchery effects, and those include the following: impacts to population viability, impacts on abundance and productivity, impacts on genetic diversity when hatchery fish spawn with wild fish or wild fish are included in hatchery broodstocks, impacts on spatial structure, ecological impacts, and hatchery facility impacts. These impacts are integrated into our analyses of baseline conditions presented in Section 3, effects of the alternatives presented in Section 4, and the cumulative effects presented here.

The *U.S. v OR* FEIS also considered the broader effects of fisheries across the Columbia River Basin, and how in total those fisheries affect the human environment within and beyond the smaller project area for this action. Those effects are described in detail in the *U.S. v OR* FEIS and incorporated into the affected environment sections of this EA (see Section 3).

Negative effects of hydropower infrastructure and operations are inevitable. Our understanding of the operation of the hydrosystem and its related cumulative effects as they pertain to resources in the basin are informed by documents evaluating these effects that have been previously completed for the Columbia Basin (NMFS 2008a; NMFS 2009; NMFS 2014a). The nature and magnitude of the effects vary, depending on the hydropower system operation, management, and specific location of the hydropower infrastructure. In the project area, some of these effects from hydropower systems that have been factored into this cumulative effects analysis include, but are not limited to the following:

- Juvenile and adult passage mortality at the eight run-of-river mainstem dams on the mainstem Snake and Columbia Rivers
- Water flow and seasonal timing (water quantity and velocity and safe passage in the migration corridor; cover/shelter, food/prey, riparian vegetation, and space associated with the connectivity of the estuarine floodplain);
- Temperature in the reaches below the large mainstem storage projects and in the mainstem migration corridors;
- Sediment transport and turbidity
- Total dissolved gas
- Food webs, including both predators and prey

With the exception of Snake River fall-run Chinook salmon, which generally spawn and rear in the mainstem, salmon and steelhead spawning and rearing habitat is found in tributaries to the Snake River. The quality and quantity of habitat in many Snake River Basin watersheds has declined dramatically in the last 150 years. Forestry, farming, grazing, road construction, hydro system development, mining, and urbanization have changed the historical habitat conditions.

5.1.1. Climate Change

Climate change has negative implications for habitats in the Pacific Northwest (Climate Impacts Group 2004; ISAB 2007a; Scheuerell and Williams 2005; Zabel et al. 2006). According to the Independent Scientific Advisory Board (ISAB)[12], these effects pose the following impacts into the future; 1) warmer air temperatures will result in diminished snowpack and a shift to more winter/spring rain and runoff, rather than snow that is stored until the spring/summer melt season; 2) with a smaller snowpack, these watersheds will see their runoff diminished earlier in the season, resulting in lower summer stream-flows. River flows are likely to increase during the winter due to more precipitation falling as rain rather than snow; 3) water temperatures are expected to rise, especially during the summer months when lower stream-flows co-occur with warmer air temperatures. These changes will not be spatially homogeneous across the entire Pacific Northwest, with low-lying areas likely to be more affected.

Climate Change and Pacific Northwest Salmon

Climate change is predicted to cause a variety of impacts to Pacific salmon and their ecosystems (Crozier et al. 2008a; Martins et al. 2012; Mote et al. 2003; Wainwright and Weitkamp 2013). The complex life cycles of anadromous fishes, including salmon, rely on productive freshwater, estuarine, and marine habitats for growth and survival, making them particularly vulnerable to environmental variation (Morrison et al. 2016). Ultimately, the effect of climate change on salmon and steelhead across the Pacific Northwest will be determined by the specific nature, level, and rate of change and the synergy between interconnected terrestrial/freshwater, estuarine, nearshore and ocean environments.

While all habitats used by Pacific salmon will be affected, the impacts and certainty of the change vary by habitat type. Some effects (e.g., increasing temperature) affect salmon at all life stages in all habitats, while others are habitat specific, such as stream flow variation in freshwater, sea level rise in estuaries, and upwelling in the ocean. How climate change will affect each stock or population of salmon also varies widely depending on the level or extent of change and the rate of change and the unique life history characteristics of different natural populations

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[12] The Independent Scientific Advisory Board (ISAB) serves the National Marine Fisheries Service (NOAA Fisheries), Columbia River Indian Tribes, and Northwest Power and Conservation Council by providing independent scientific advice and recommendations regarding scientific issues that relate to the respective agencies' fish and wildlife programs.

(Crozier et al. 2008b).

Like most fishes, salmon are poikilotherms (cold-blooded animals), therefore increasing temperatures in all habitats can have pronounced effects on their physiology, growth, and development rates (see review by (Whitney et al. 2016)). Increases in water temperatures beyond their thermal optima will likely be detrimental through a variety of processes including increased metabolic rates (and therefore food demand), decreased disease resistance, increased physiological stress, and reduced reproductive success. All these processes are likely to reduce survival (Beechie et al. 2013; Wainwright and Weitkamp 2013; Whitney et al. 2016). Temperatures below thermal optima can increase growth and development rates. Examples of this include accelerated emergence timing during egg incubation stages, or increased growth rates during fry stages (Crozier et al. 2008a; Martins et al. 2012). Temperature is also an important behavioral cue for migration (Sykes et al. 2009), and elevated temperatures may result in earlier-than-normal migration timing. While there are situations or stocks where this acceleration in processes or behaviors is beneficial, there are also others where it is detrimental (Martins et al. 2012; Whitney et al. 2016).

Freshwater Effects

Climate change is predicted to increase the intensity of storms, reduce winter snow pack at low and middle elevations, and increase snowpack at high elevations in northern areas. Middle and lower elevation streams will have larger fall/winter flood events and lower late summer flows, while higher elevations may have higher minimum flows. There are several studies that have applied a model to understand the implications of climate change on Salmon River Basin hydrology. These studies found that warming results in an earlier shift in the timing of the snowmelt peak (Sridhar et al. 2013; Tang and Lettenmaier 2012). River flow is already becoming more variable in many rivers (Ward et al. 2015).

How these changes will affect freshwater ecosystems largely depends on their specific characteristics and location, which vary at fine spatial scales (Crozier et al. 2008b; Martins et al. 2012). Changes in stream temperature and flow regimes will likely lead to shifts in the distributions of native species and provide “invasion opportunities” for exotic species. This will result in novel species interactions including predator-prey dynamics, where juvenile native species may be either predators or prey (Lynch et al. 2016; Rehage and Blanchard 2016). How juvenile native species will fare as part of “hybrid food webs,” which are constructed from natives, native invaders, and exotic species, is difficult to predict (Naiman et al. 2012).

Marine Impacts

As with changes to stream ecosystems, expected changes to marine ecosystems due to increased temperature, altered productivity, and acidification, will have large ecological implications through mismatches of co-evolved species and unpredictable trophic effects (Cheung et al. 2015; Rehage and Blanchard 2016). These effects will certainly occur but predicting the composition or outcomes of future trophic interactions is not possible with the tools available at this time.

In marine waters, increasing temperatures are associated with observed and predicted poleward range expansions of fish and invertebrates in both the Atlantic and Pacific oceans (Asch 2015; Cheung et al. 2015; Lucey and Nye 2010). Minor changes to the timing, intensity, or duration of upwelling, or the depth of water column stratification, can have dramatic effects on the productivity of the ecosystem (Black et al. 2014; Peterson et al. 2014). Current projections for changes to upwelling are mixed: some climate models show upwelling unchanged, but others predict that upwelling will be delayed in spring, and more intense during summer (Rykaczewski et al. 2015). Should the timing and intensity of upwelling change in the future, it may result in a mismatch between the onset of spring ecosystem productivity and the timing of salmon entering the ocean, and a shift towards food webs with a strong sub-tropical component (Bakun et al. 2015).

The world's oceans are becoming more acidic as increased atmospheric CO_2 is absorbed by water. Laboratory and field studies of ocean acidification show it has the greatest effects on invertebrates with calcium-carbonate shells and relatively little direct influence on finfish (see reviews by Haigh et al. (2015); Mathis et al. (2015). Consequently, the largest impact of ocean acidification will likely be its influence on marine food webs, especially its effects on lower trophic levels, which are largely composed of invertebrates (Haigh et al. 2015; Mathis et al. 2015).

Uncertainty in Climate Predictions

Many of the effects of climate change (e.g., increased temperature, altered flow, coastal productivity, etc.) will have direct impacts on the food webs that species examined in this analysis rely on in freshwater, estuarine, and marine habitats to grow and survive. Such ecological effects are extremely difficult to predict even in fairly simple systems, and minor differences in life history characteristics among stocks of salmon may lead to large differences in their response (e.g., Crozier et al. (2008b); Martins et al. (2011); Martins et al. (2012)). Although there is high certainty that predicted physical and chemical changes will occur, the ability to predict bio-ecological changes to fish or food webs is extremely limited, leading to considerable uncertainty.

5.1.2. Development

Human populations are increasing primarily in urban metropolitan areas, with smaller increases in rural areas. Increases in demand for water, land, power, agriculture, roads, and housing are associated with this growth. Approximately 6 million people live in the Columbia River Basin, concentrated largely in urban parts of the lower Columbia River and the Willamette Valley. The population is presently expanding and is likely to continue to grow in the foreseeable future. Provided below is a bulleted list of development trends taken from ISAB (2007b).

- Freshwater withdrawals for domestic, industrial, commercial, and public uses are increasing (71-85% by 2050)
- Withdrawals for irrigation purposes are decreasing (6-12% below 2000 levels by 2015) due to the conversion of agricultural lands to residential areas
- Electricity demand is projected to grow by just less than 1 percent per year to 2025
- Forests are being converted for development (44 million acres between 2007 and 2030), which is resulting in forest fragmentation
- Mining in the Columbia River Basin is and will continue to be focused on sand and gravel along or within rivers for use in concrete and asphalt
- An increase in ship traffic is likely to occur because of Columbia River channel-deepening projects
- New port infrastructure projects continue to result in loss of aquatic habitat
- Hazardous materials transport and airborne pollution have been increasing in the Columbia River Basin.

5.1.3. Habitat Restoration

Throughout the Columbia River Basin, habitat restoration efforts are supported by Federal, state, and local agencies; tribes; environmental organizations; and communities. Projects supported by these entities focus on improving general habitat and ecosystem function or species-specific conservation objectives that, in some cases, are identified through ESA recovery plans. The larger, more region-wide, restoration and conservation efforts, either underway or planned throughout the Columbia River Basin, are presented below. These actions have helped restore habitat, improve fish passage, and reduce pollution. While these efforts are reasonably likely to occur, funding levels may vary on an annual basis. Some examples include:

- National Oceanic and Atmospheric Administration (NOAA) – Community-based Restoration Program (CRP)
- NMFS – Pacific Coastal Salmon Recovery Fund (PCSRF), Columbia and Snake Rivers
- Northwest Power Planning and Conservation Council – Fish and Wildlife Program, Columbia and Snake Rivers
- State of Idaho – ESA Section 6 Cooperative Agreement
- State of Oregon – Oregon Plan for Salmon and Watersheds
- State of Washington – Governor’s Salmon Recovery Office
- Miscellaneous Funding Sources – Regional and Local Habitat Restoration and Conservation Support

5.1.4. Hatcheries and Harvest

Throughout the Columbia River Basin, hatchery and harvest actions are supported by Federal, state, and local agencies; tribes; environmental organizations; and communities. While these efforts are reasonably likely to occur, funding levels may vary on an annual basis. Some examples include:

- Increases in hatchery programs to supplement the SRKW prey base
- The *US v Oregon Management Agreement* that provides a framework for mainstem Columbia River salmon and steelhead harvest, and hatchery production above Bonneville Dam
- NOAA's funding of hatchery programs through the Mitchell Act
- Ocean harvest coordinated through the Pacific Fishery Management Council

5.2. Cumulative Effects Analysis

This section considers impacts that may occur as a result of any one of the alternatives being implemented at the same time as other anticipated future actions and presents information in the context of future climate change.

5.2.1. Wildlife

The effects of climate change on wildlife could include decreased distribution because of warmer summer temperatures, temperature pattern shifts, or reductions in food availability through effects on prey species such as salmon and steelhead. Reduction in salmon and steelhead carcasses would decrease nutrients available to wildlife, and reduction in the number of live fish could affect predators such as bald eagles and golden eagles.

Under Alternatives 1, 2, and 3 of this EA, salmon and steelhead would continue to either be prey for wildlife or provide nutrients. Although climate change and development may have negative effects on salmon and steelhead, the fisheries would be managed to ensure that fishing is curtailed in years of low abundance throughout the area and hatcheries would continue to provide adult spawners. Furthermore, habitat restoration could offset some of the negative effects. Under Alternative 4 of this EA, the cumulative impacts on wildlife may differ from other alternatives because the proposed fisheries would not occur, leaving more adults to spawn and serve as prey. When aggregated with the impacts of past, present, and reasonably foreseeable future actions affecting wildlife in the project area, the proposed action and its alternatives would make a minor additive contribution to cumulative negative impacts of reducing prey availability, via harvest removal, on wildlife.

5.2.2. Fish

5.2.2.1. Salmon and steelhead

The effects of climate change on salmonids would vary, but they could potentially negatively affect every species and life history stage of salmonids in the Columbia River Basin through changes in distribution, temperature stress, altered migration, emergence timing, etc. Development is also likely to negatively affect salmon and steelhead populations via pollution and alteration of habitat use. However, some of these effects may be offset by the benefits of habitat restoration and hatchery programs in some areas.

All alternatives, except Alternative 4, remove salmon from the spawning population, and could reduce productivity of species targeted by the proposed fisheries (i.e., fall Chinook and coho salmon, and resident trout into the future). This reduction added to the negative effects of development, climate change, and harvest downstream and in the ocean (it should be noted that the latter two are already accounted for once fish arrive at Lower Granite Dam) mean there is likely to be a net negative effect on salmon and steelhead populations in the project area that is greater than what was determined in section 4 for the alternatives analyzed alone. However, our analyses in chapter 4 did discuss the effects on Snake River fall Chinook and coho salmon from the ongoing steelhead fisheries because all three overlap in time and space. As noted above, habitat restoration and hatchery actions could offset some of this cumulative negative effect, and the increment of effect of the proposed action on total cumulative impacts is minor.

5.2.2.2. Other fish

Under future conditions, other fish species may experience additional stress from higher temperatures and other effects associated with climate change. However, some of these fish species could benefit from climate change via range expansions. Development is likely to negatively affect other fish species similar to the way it affects salmon and steelhead, but habitat restoration is also likely to serve as a benefit.

Impacts of the alternatives on other listed and non-listed fish species are low to negligible (Section 4.2, Fish), and thus would be expected to make only a minor additive contribution to cumulative effects on these species.

5.2.3. Vegetation

The potential benefits and risk to vegetation as a result of future climate change, development, or restoration activities is difficult to predict. As a result of changing climate, there may be a transition in the prevalence of plant species found along the riverbank. However, the effects of the alternatives on vegetation are expected to be negligible, and these effects are not likely to change when aggregated with the impacts of past, present, and reasonably foreseeable future actions affecting vegetation in the project area.

5.2.4. Socioeconomics

Climate change, development and habitat restoration are likely to alter socioeconomics in the area, but it may necessitate a shift in the community structure. For example, increased development, and habitat restoration could offset losses from the recreational fishing community that may occur due to climate change impacts on fish species. However, while the net difference may be minimal, it could be that certain subsets of the economy are unable to shift. For example, a recreational fishing guide may be unable or unwilling to switch to a new area of employment. For tribes such as the Nez Perce, salmon fishing is essential to their ability to engage in treaty-reserved salmon fishing and related activities that are culturally, spiritually, economically, and symbolically important to the tribes (Section 3.6, Socioeconomics).

Under Alternatives 1 through 3, the cumulative impacts would likely be similar to those described in Section 4.4, Socioeconomics. This is because even if fish abundance were to decline, people would still likely be interested in fishing, and hatchery programs exists to bolster the abundance of fish targeted by each fishery. Because the proposed fisheries would not occur under alternative 4, the cumulative effect of this alternative combined with other actions is likely to result in a greater negative effect on socioeconomics than the first three alternatives.

5.2.5. Environmental Justice

The environmental justice communities of concern within the project area include low income, minority populations, and Native Americans (Section 3.5, Environmental Justice). These communities may benefit from increased development in the area in the form of goods and services such as healthcare and education access. However, climate change is likely to alter the native foods that some communities rely on, such as salmon. Harvest of salmon increases income for these communities of concern and provides fish for ceremonial and subsistence purposes, particularly for Native Americans who benefit from an economic, subsistence, and ceremonial perspective. Some of this potentially negative change may be offset by the benefits of habitat restoration projects.

Under Alternative 1, harvest rates would remain similar to what they have been assuming future conditions result in an overall reduction in abundance of the proposed fisheries' target species, Alternative 1 would not be responsive to abundance declines in the future that are more severe than what has been observed. Therefore, Alternative 1, when added to other reasonably foreseeable actions may have minor additional cumulative effects on environmental justice communities of concern that were not already discussed in Section 4.5, Environmental Justice.

Under Alternatives 2 and 3 fisheries will be adaptively managed to reduce impacts. These changes may result in beneficial or adverse impacts to environmental justice communities of concern that rely on the proposed fisheries (especially for an Indian tribe like the Nez Perce who rely on fall Chinook fishing for subsistence and to generate jobs and income). An example of an adverse effect would be a continued reduction in the number of salmon and steelhead available for the tribe's ceremonial and subsistence harvest and may result in a deterioration in cultural practices and the erosion of salmon and steelhead as a core symbol of tribal identity, health, individual identity, culture, spirituality, religion, emotional well-being, and economy. These effects are not likely to change when aggregated with the impacts of past, present, and reasonably foreseeable future actions affecting vegetation in the project area.

6. List of Agencies and Persons Consulted

During development of this EA, NMFS consulted with the following Tribes, agencies, and organizations:

- IDFG
- WDFW
- ODFW
- Nez Perce Tribe
- Shoshone-Bannock Tribes
- Confederated Tribes of the Umatilla Indian Reservation

7. Response to Comments

During the Public Comment period from July 11, 2019 to August 12, 2019, we received five comment letters containing two unique comments. Those comments and our responses are detailed below.

Comment #1: The returns of Snake River fall Chinook salmon have decreased in recent years, and therefore a fishery should not be allowed.

Response: The draft EA acknowledged that the size of the Snake River fall Chinook salmon run to the Columbia River has decreased recently when compared to 2015. Furthermore, there has been a decrease in the natural-origin component of the run from 15,034 natural-origin adults in 2015 to 6,134 adults in 2017. However, recent abundances still exceed the abundances that the harvest schedule proposes would be needed to open adipose-intact fisheries for state recreational fishermen (i.e., CAT). Natural-origin abundance also exceeds the MAT value identified in the recovery scenario for the Snake River fall Chinook salmon ESU as needed to achieve viability. In addition, the harvest schedule is designed to decrease impacts to natural-origin fall Chinook salmon as abundance decreases according to the harvest schedule. Thus, if we were to continue to see declines in abundance, harvest rates would decrease. Our analysis of the proposed harvest schedule concluded that fall Chinook salmon fisheries based on that schedule will not appreciably reduce the likelihood of survival and recovery of the Snake River fall Chinook salmon ESU (NMFS 2019b).

Comment #2: Due to the overlap with steelhead, an adipose-intact fall Chinook salmon fishery will have incidental effects on ESA-listed steelhead.

Response: We agree that because of the overlap of the proposed fall Chinook and coho salmon fisheries with natural-origin steelhead, salmon fisheries will have additional incidental impacts on ESA-listed steelhead in the Snake River. Because there are also fisheries for steelhead occurring in the same time frame, it is difficult to determine how much of the impacts are due to steelhead fisheries and how much are due to fall salmon fisheries. However, we recently completed a Biological Opinion on the Snake River steelhead fisheries that analyzed the effects of fixed impact rates on each steelhead Major Population Group in the Snake River Steelhead DPS. We found that these fixed rates would not appreciably reduce the likelihood of survival and recovery of the DPS (NMFS 2019c). Included in these fixed rates were the effects of all fisheries occurring in the Snake River Basin on steelhead, including fall salmon fisheries.

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